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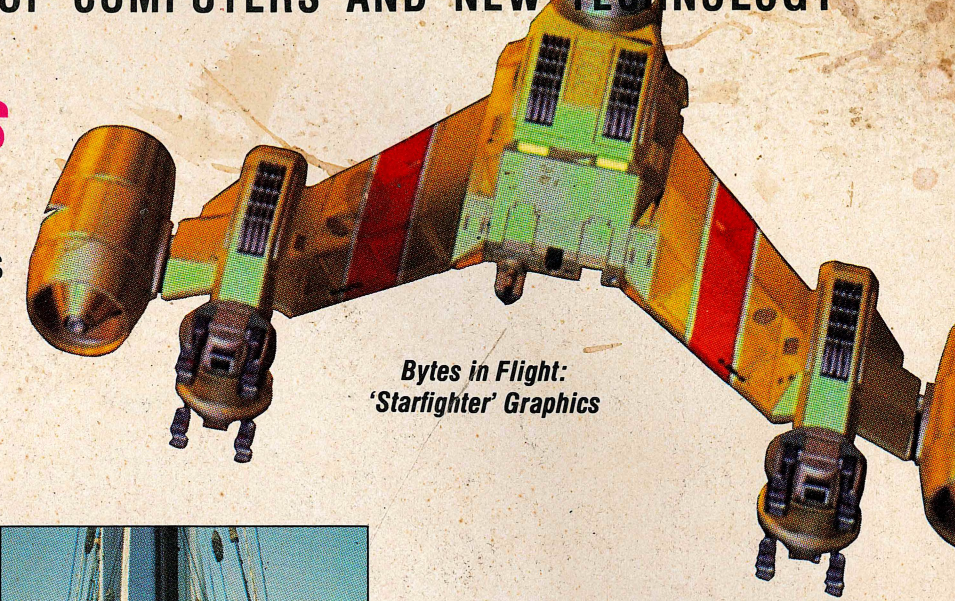
COMPUTER GREATS & GLITCHES

The First Annual ENTER Awards

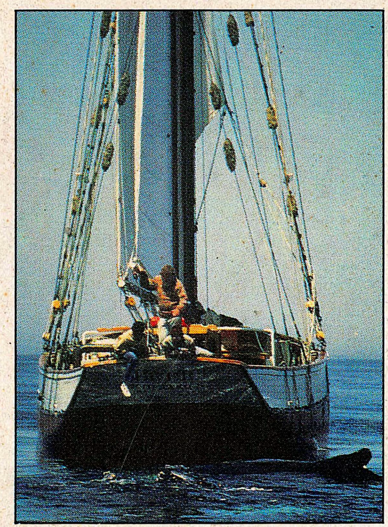
PROGRAMMING

ROCK & ROM: How Computers Created 1984's Top Rock Videos

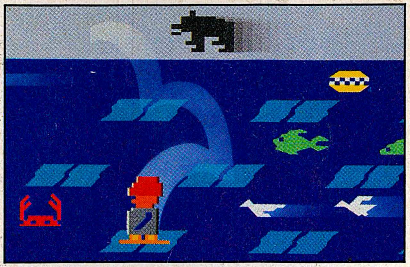


Bytes in Flight: 'Starfighter' Graphics

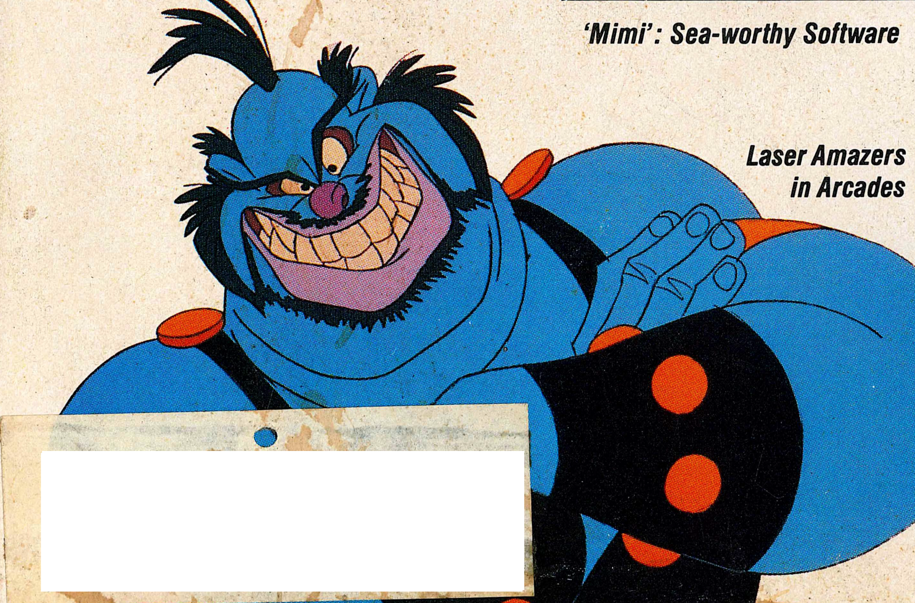
Printer Power: Low-Price, High-Grade



'Mimi': Sea-worthy Software



Hopping Copycats: Q*Bert Clones

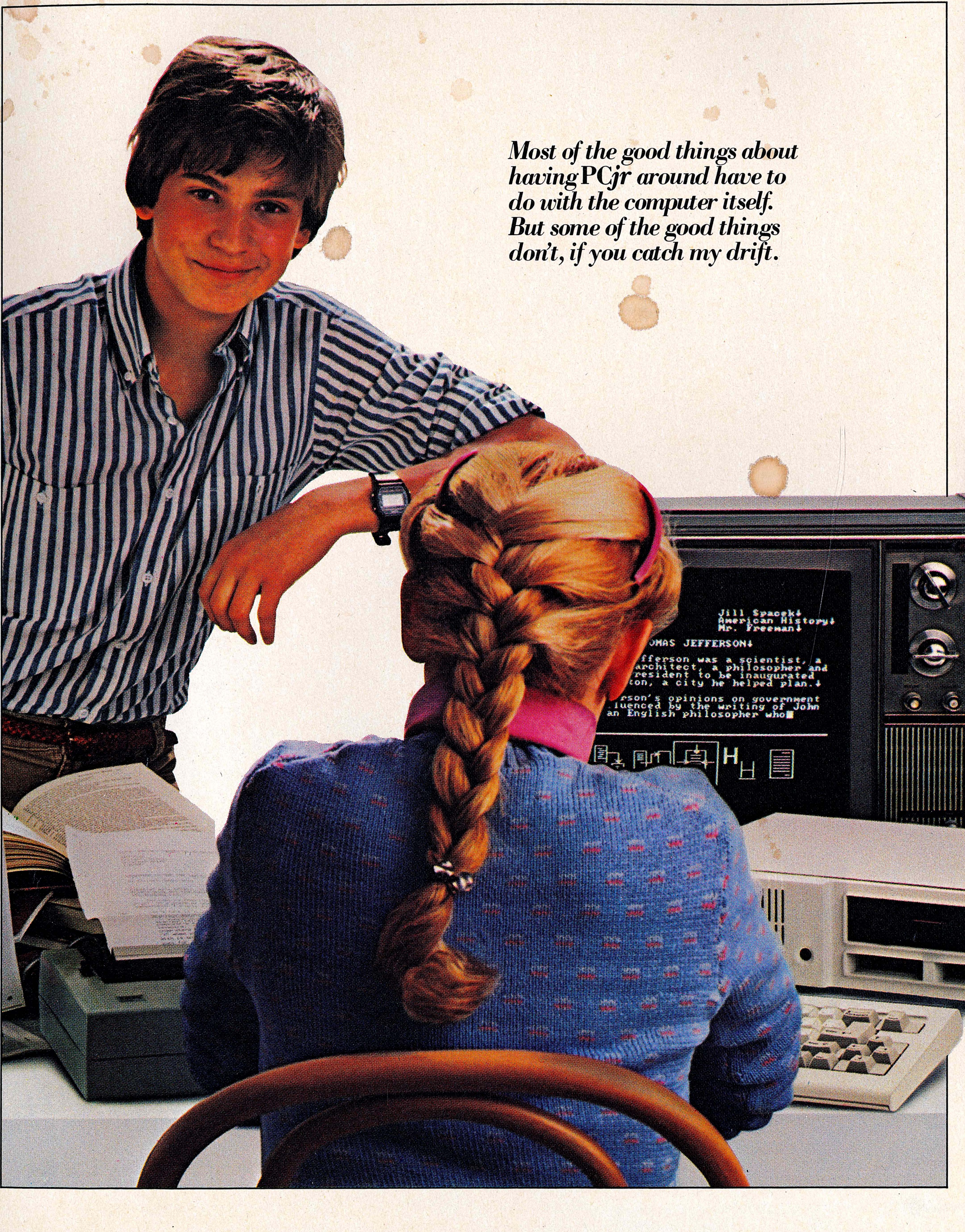


Laser Amazers in Arcades

Mac Attack: A Mouse That Roars

The advantages of owning the IBM PC*jr.*

Most of the good things about having PCjr around have to do with the computer itself. But some of the good things don't, if you catch my drift.


Jill Spacek↓
American History↓
Mr. Freeman↓
OMAS JEFFERSON↓
fferson was a scientist, a
architect, a philosopher and
resident to be inaugurated
ton, a city he helped plan.↓
rson's opinions on government
luenced by the writing of John
an English philosopher who
H

Little Tramp character licensed by Bubbles Inc.

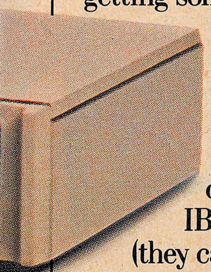
by Andy Cunningham

My friend Jill here (it's not quite to the "girlfriend" stage yet) likes my PC*jr* almost as much as she likes me. Maybe more. Every time she's got a paper or something to do, she comes over here to do it.

One advantage* PC*jr* *has over other computers is the awesome amount of stuff you can get to go with it. Games, printers, monitors, modems, joysticks—five birthdays' worth at least.

That's the way it goes when you get a computer. Your friends will expect you to let them use it. Some of them will even expect you to teach them how.

I don't really mind. For one thing, they're my friends. And for another thing, for such a powerful computer, PC*jr* is easy to learn. So getting somebody started on it isn't any big deal. (Especially somebody as intelligent and talented as Jill.)



You know all the things you can buy to customize a car? Well, IBM has all kinds of things (they call them "peripherals") to customize a PC*jr*. If you want to play games, you'll probably want a couple of joysticks. If you have to write term papers (it's not a question of wanting), you'll need a printer. If you want to connect up to electronic information libraries over the telephone (you'd be amazed at how many there are), you'll have to have something called a modem.

What you end up buying besides the computer itself all depends on what you plan to use the computer for. But whatever you have in mind, PC*jr* can probably handle it. That's because IBM designed this computer to accept all kinds of peripherals, including things that haven't even been invented yet.

I don't want to get too technical on you, but there's one technical thing you ought to know about the PC*jr*. It works exactly the same as the original IBM Personal Computer, because it has the same microprocessing chip (the brains of a computer) inside it. That means that a PC*jr* and a PC with the same amount of memory can run nearly all the same software. And that's important, because it seems like more people are writing more programs for the PC than for any other computer around.

IBM PC*jr* SPECIFICATIONS

Memory
User Memory (RAM):
64-128KB
(expandable to 512KB)
Permanent Memory
(ROM):64KB

Diskette Drive
Double-sided,
double density
Capacity 360 KB

Processor
16-bit 8088

Keyboard
Typewriter-style
Detached; cordless

Warranty
1-year limited warranty

Software
Runs over 1,000 programs
written for the IBM PC
Runs both diskette and
cartridge programs

Display
40- and 80-column
Resolution:
4-color: 640h x 200v
16-color: 320h x 200v

Expandability
Open architecture
Option 128KB
Memory Expansion
Attachment(s)
13 ports for add-ons,
including built-in
serial interface

Even if you don't know exactly what all these facts mean, you can still use them to compare* PC*jr* *to other computers.

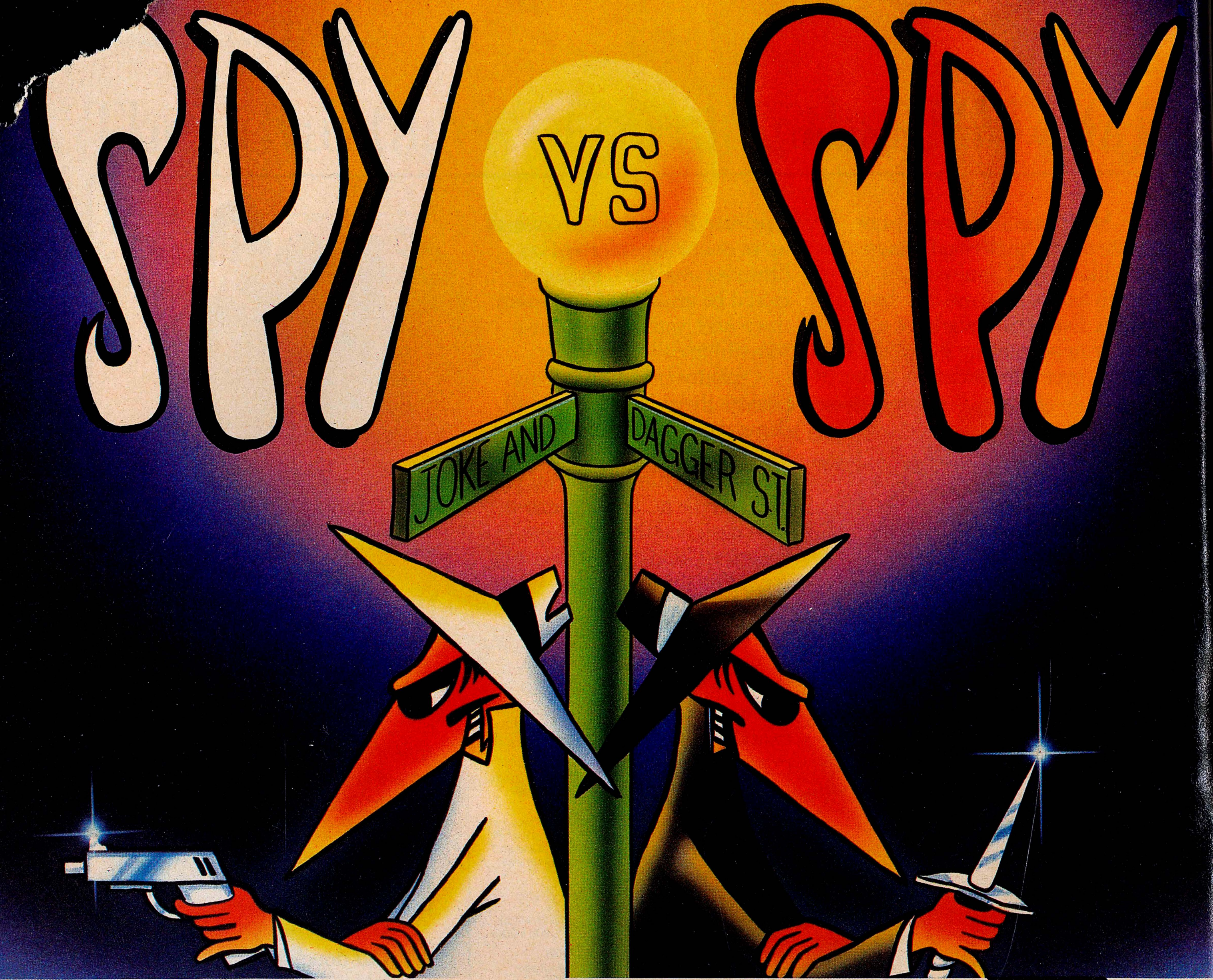
Sometimes it's easy to forget, but there's more to life than just computing.

I like to think that I'm a regular, all-around kind of guy with lots of different interests. I'm telling you this because I don't want you to get the idea that I just sit at my computer all day. The way I see it, a computer is just a thing to help you get stuff done.

And since my PC*jr* helps me get stuff done, it seems like I've had lots more free time since I got it. And I'd say Jill's had more free time since she's been using it. So wouldn't you think the two of us would have time to go to the movies together once in a while or something? Well, it's like I said before. Not quite at the "girlfriend" stage yet.

IBM®
PC*jr*

To see the IBM PC*jr*, just call 1-800-IBM-PCJR for a store near you. In Alaska or Hawaii, 1-800-4890



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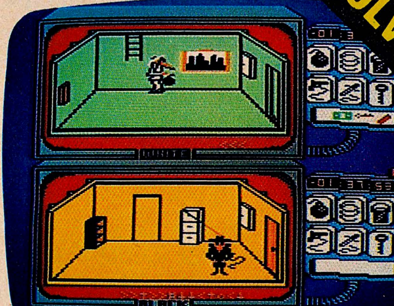

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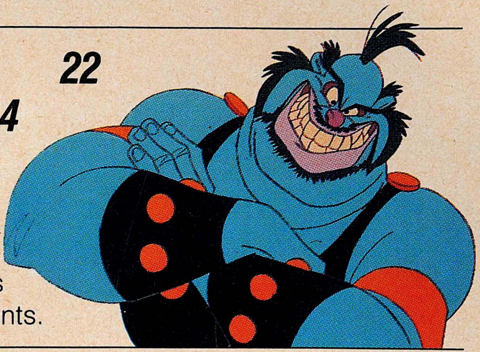
ENTER

JANUARY/ FEBRUARY 1985

VOLUME 2, NUMBER 4

FEATURES



GREATS AND GLITCHES: THE ENTER AWARDS, 1984 — 22

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A KATIE PARKER CAPER — 58

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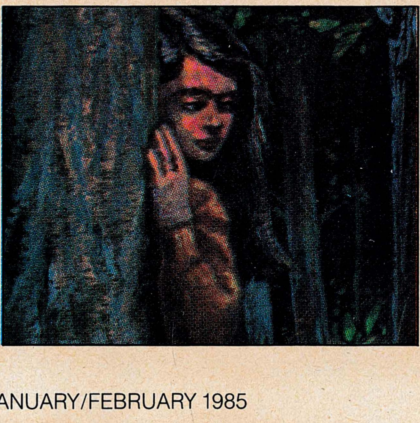

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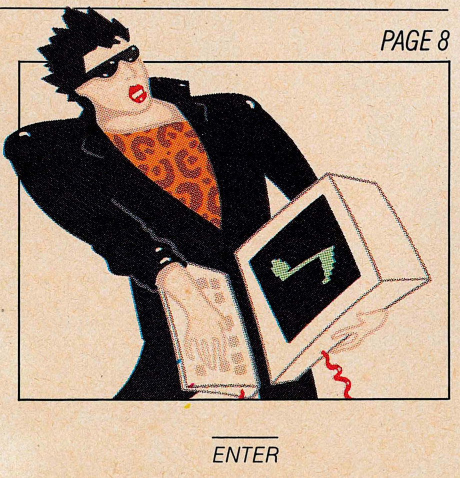

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PROGRAMMING

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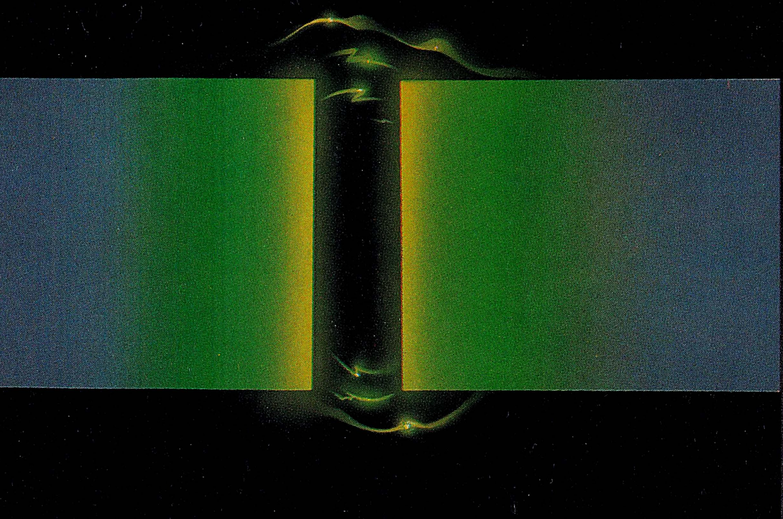
A new hands-on, pull-out programming section. Includes BASIC Training programs for nine computers, Ask Enter, Pencil Crunchers, Feedback and more.

Cover: See credits, pages 22-24.

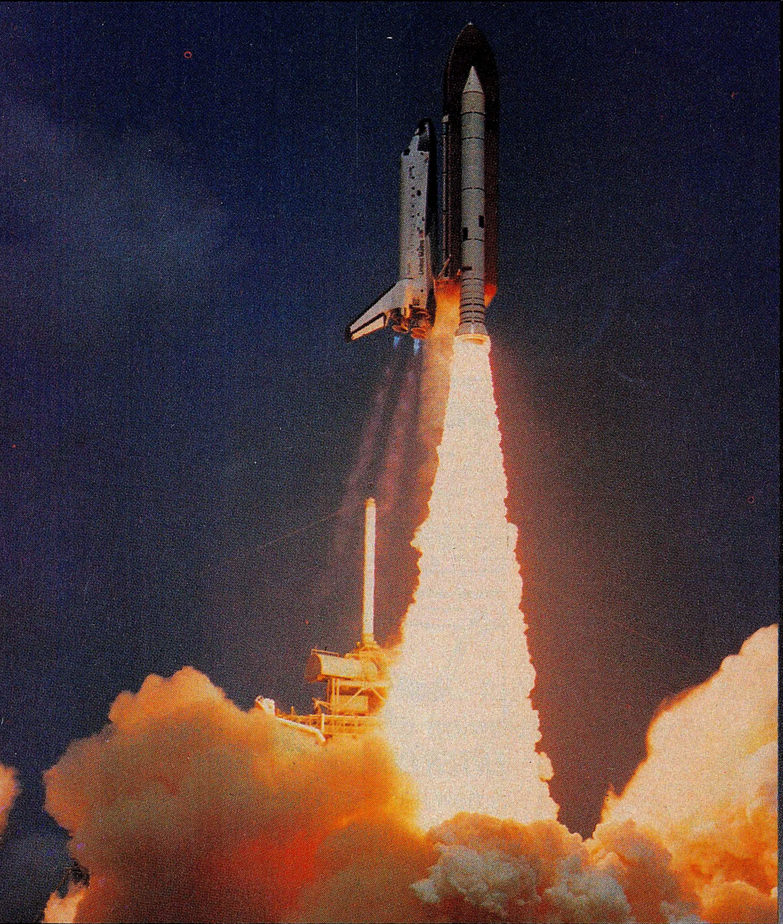
CONNECT.

THE MAZE BECKONS. THE FLAMES THREATEN. MASTER YOUR LOGIC AND INTUITION, AND ALL PATHS WILL CONNECT IN A FLASH OF REVELATION.



GAME 1 5205 FACES 2
8502
Zenji
BY MATTHEW HUBBARD
ACTIVISION

Designed by Matthew Hubbard.



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YOU BEGIN AN UNPRECEDENTED SPACE FLIGHT SIMULATION. CALCULATE THRUST, TRAJECTORY, PITCH AND YAW.

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TRAPPED MINERS. BLOCKED SHAFTS INFESTED WITH VILE CREATURES. YOUR AIR RUNS LOW . . . YOU HESITATE . . . BUT THEIR FATE IS IN YOUR HANDS.

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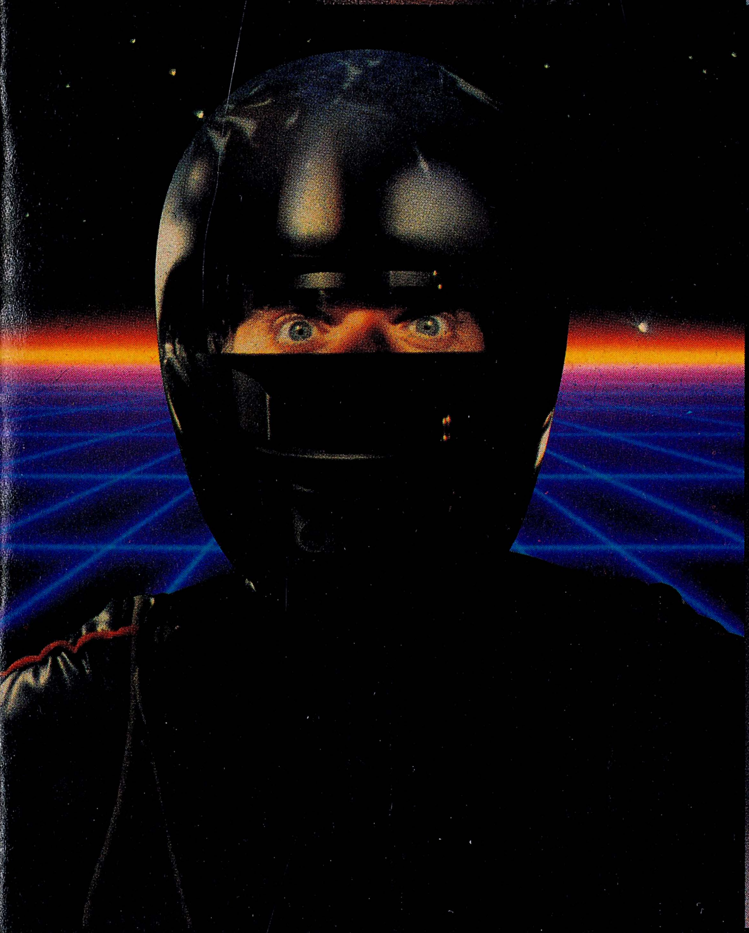

SOLO.

CAUGHT ON A WEB OF INFINITE BEAMS. INSTANT REFLEXES ARE YOUR ONLY HOPE, YET THE HURTLING LASERS BLIND YOU.
THIS IS NO JOYRIDE.

10
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INSIDE STORY

AWARDS & DISAPPEARANCES

Nineteen eighty four may have been George Orwell's year, but it was also the best (and worst) of times. What the dickens are we saying? Simply that some things that happened in 1984 showed the world of computers at its best...and some were silly, wasteful and downright dumb. In "Greats and Glitches: The ENTER Awards, 1984," we make note of both.

Though we had a lot of fun choosing them, these awards weren't given lightly. ENTER took more than 50 nominations from our contributing editors, advisors and 10-member youth advisor board. We also tabulated nominations from more than 1000 readers who answered our October "Input" poll. After we found the most popular nominations, the ENTER staff voted on the finalists. The whole process took more than a month.

Last year wasn't all highs and lows. There were also some disappearances. A number of computer companies went out of business, or discontinued their home computer lines. But the *users* of those computers didn't disappear. As ENTER staffer Jessica Wolfe discovered, Timex/Sinclair, Texas Instrument, Mattel Aquarius and other computer owners have banded together and are still computing away. Her informative piece in "Connections" is must reading for anyone with one of these endangered computers.

ENTER isn't just living in the past. This issue also features the first appearance of a new department. ENTER CENTER brings together all of our hands-on stuff—programming, BASIC Plus tips, Ask ENTER, pencil crunchers, and more. We think you'll find it handy to pull out and place by your computer. As the year goes by, you can save all of our programs. When 1985's over, you can combine them into into one master programming book.

After all, saving your programs is a far, far better thing to do.

Ira Wolfman

Ira Wolfman
Editor

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VOL. 2, NO. 4, JANUARY/FEBRUARY 1985 © 1985

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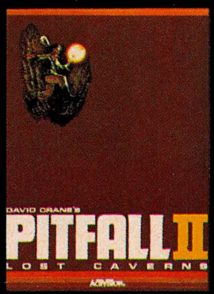
LOST.

ENDLESS CAVERNS. ATTACKING BEASTS. FIND THE DIAMOND, THE GOLD. MAYBE.



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BITS

ILLUSTRATIONS © CAMERON WASSON

ROM AND ROLL

Some say computers can't hold a drumstick to rock music, but KGON 92 FM doesn't agree.

Micros and rock share a home at this Portland, Oregon, radio station. KGON has set up "Rockfiles," a database on a TRS-80 color computer, so that computer users can tap into the latest rock news.

This electronic bulletin board gives up to 15 minutes worth of rock and roll information to each caller. Using a computer hooked to a modem, you can find out what albums are hot and who's climbing the KGON charts.

"The real appeal of the system is its library of rock facts and figures," says "Rockfiles" user Kirk Rasco. There are also concert calendars, album reviews, and reports on top-selling video games and VCR cassettes. Users can even exchange opinions about the hottest rock by leaving messages on the "Rockfiles" electronic bulletin board.

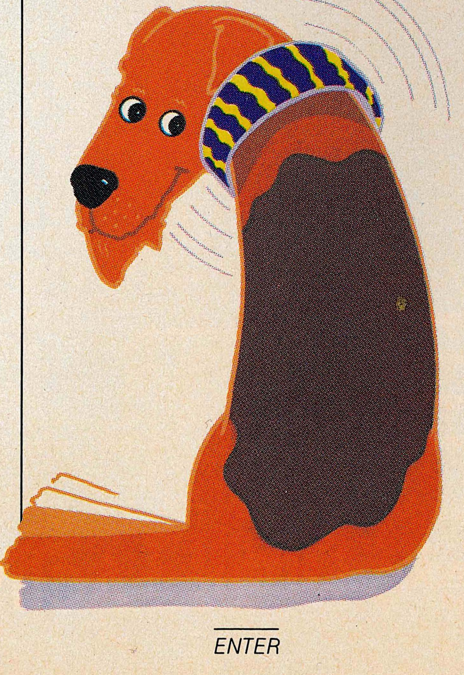
Who says ROM and RAM and Rock and Roll don't mix?

FLEAS' FOE

Your dog's got fleas? You've tried everything from flea baths to flea collars, and that poor pooch is still itching like there's no tomorrow? Well, the cure may be in sight....or in sound. *Ultrasonic* sound, that is.

Biotechnology, Inc. of Miami, Florida, has invented an electronic flea collar. This collar doesn't cook the fleas; it uses ultrasonic sound waves to get rid of them. The collar comes with a small speaker attachment that sends out ultrasound pulses. The folks at Biotechnology say this sounds like a jackhammer to the fleas, but it won't bother the dog.

Pestering the pests, claims the company, will make fleas flee.



A BETTER IDEA?

When you shop for a new car, remember to kick the tires and touch the *computer* screen.

The Ford Motor Company is installing touch-screen computers in dealer showrooms. The computers are programmed to answer questions about cars, options and accessories. Ford hopes to set up 2,000 "Selection Center" computers by 1986. So far, customer reaction seems positive. "Many younger people respond more favorably to a computer than they do to a salesman," says Ford representative Thomas Wagner. "The computer has more credibility."

Ford promises that computers will *not* replace sales people, however. After all, what would happen if car buyers got so confused they touched the tires and kicked the screen? Crash!

"The machine works in a trouble-free manner, and is really a pleasure to use."
Robert J. Burdett—Oak Park, Illinois

"I was so pleased with the ADAM that I took it to school and gave a presentation to the entire school body. When I was finished many of my peers were raving over the ADAM."
Michael DiJulio—Chicago, Illinois

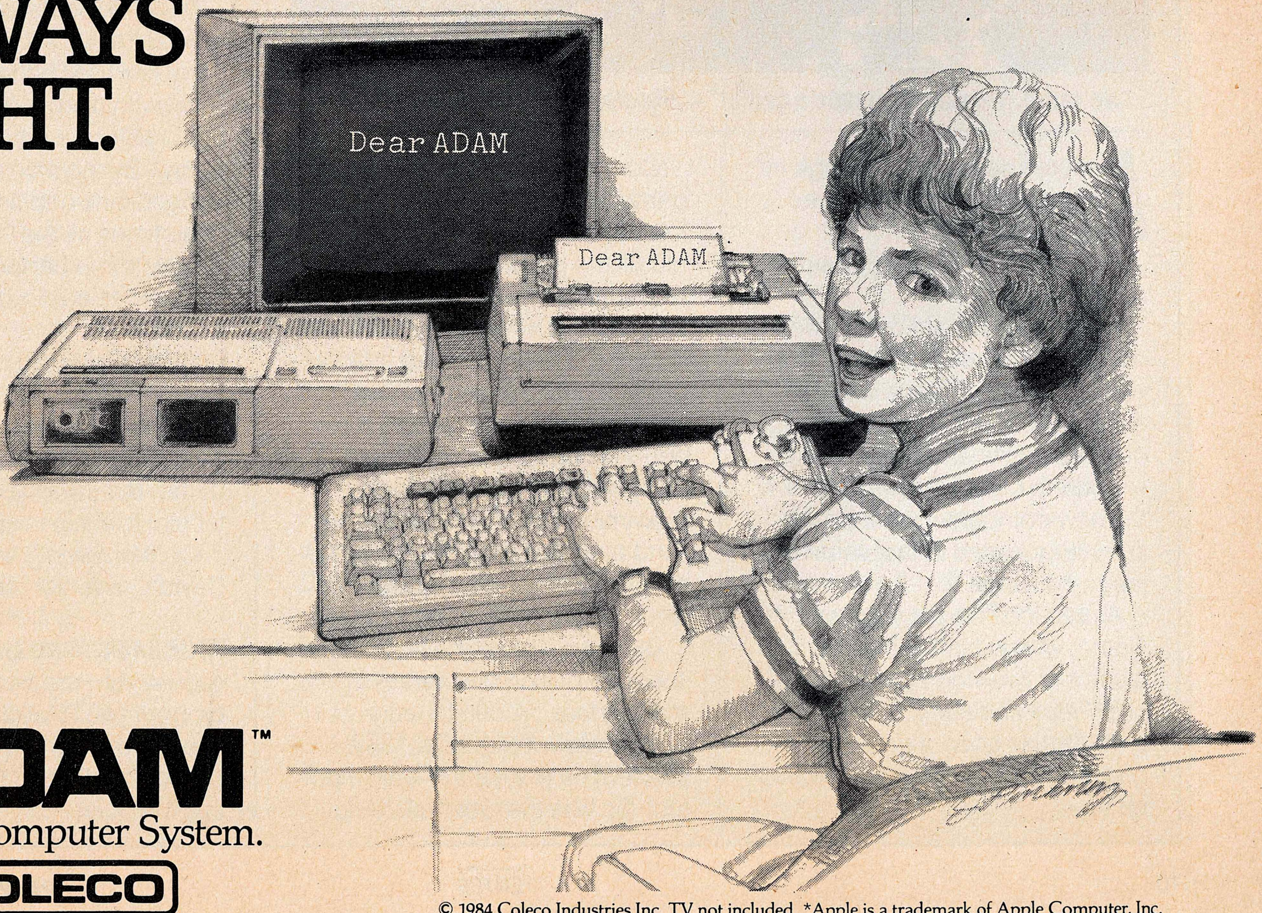
"You have an excellent machine for the home user. Smart LOGO and Smart Filer are excellent...Smart Keys make it very easy to use the software, even before you read the instructions completely."
Wayne Motel—Dyer, Indiana

"Your keyboard is better than the Apple.*"
Donald Prohaska—San Diego, California

"I find the word processor and the basic programming language to be very user friendly."
Gordon R. Franke—Kirksville, Missouri

"I am more than pleased with the operation of the machine, and not having any experience with computers, I am happy that finally someone has produced a machine not only at a reasonable cost, but one that you can nearly sit down and start using without any training period."
Frederick A. Tripodi—New York, New York

THE CUSTOMER IS ALWAYS RIGHT.



ADAM™
Family Computer System.
COLECO

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NEWS BEAT

EDITED BY RICHARD CHEVAT

GAME-BUSTERS

"We came. We saw. We made a game!"—*Ghostbusters* creator David Crane.

If there's something strange in the neighborhood, who you gonna call?

David Crane! He ain't afraid of no ghosts!

And he ain't afraid of six week deadlines, either. Six weeks, you see, is how long Crane and a team of Activision programmers, graphic artists and other designers had to create *Ghostbusters*—the new computer game based on (you guessed it) last summer's mega-hit movie.

A rush job? No way, claims Crane, who is best known as creator of two video game megahits, *Pitfall* and *Pitfall II: Lost Caverns*. "It's as good a game as I could do if I took 10 years to do it," he says.

Crane is the brain behind the game. But, he admits, the other folks at Activision helped a lot. "I did all the programming on *Ghostbusters*," he explains. "But I also worked as what we call 'the director.'" Crane directed a *Ghostbusters* design team who helped with details like the game's music and the title screen. The team included a graphic artist, programming assistant Mark Bellin, "and people at Activision who I'd call and ask to help out with one-week projects."

But even with all the help, it was tough to pull off this game-making feat. "A combination of things made it possible," says Crane. The team effort was important. So was the fact that David had been working for two months on a "game without a theme" when Activision brass asked if he'd like to design the *Ghostbusters* game.

"I'd been programming this game idea for a while. I had some good screens—like a car driving around on city streets," recalls Crane. "But [the idea] wasn't going anywhere because the game had no theme." Combining this preliminary programming work with the hit movie's theme was "serendipity," according to Crane. "Without that, we couldn't have done it."

One other bit of luck helped Crane turn *Ghostbusters* into a game—the movie itself.

"I think *Ghostbusters* [the movie] translates very easily into a game format," he says. The movie "has everything a good game has—action, adventure...and it's funny." By the time the game was done, Crane had seen the movie three times all the way through, and watched certain action scenes "at least a dozen times each."

David Crane crammed a lot of viewing, programming, directing, and designing into the six weeks it took to create the *Ghostbusters* game. But it was very important for him to finish in six weeks. Why?

On the seventh week, you see, David Crane got married.

TRUE BASIC IS NO LIE: Coming soon—from the people who brought you BASIC—a new, improved programming language called True BASIC. And that's the truth!

True BASIC is a new version of the most popular home computer language. "So much has changed in the 20 years since the first BASIC was written at Dartmouth," says Stew Chapin, director of marketing for True BASIC. "We can do a lot more now that we don't have to squeeze everything into the 4K we had on the first micros."

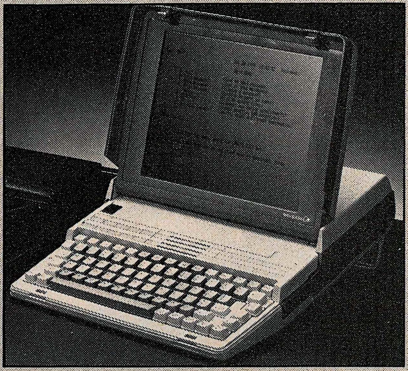
One of the exciting features of True BASIC is that it "will look the same on every computer it runs on," promises Chapin. "Your graphics program won't have to be rewritten every time you move to a new computer."

That's not all. This language uses a new approach to programming that has developed in the last 10 years—structured programming. This means that many of True BASIC's features are designed to help you write simpler, easy-to-understand programs.

For example, the old FOR NEXT loop in BASIC has been replaced with several new ways of looping. They are designed to give you greater control over when and how to end the loop.

True BASIC comes as a software package and will require 128K to run. It needs that room to include a screen and text editor (programs that allow you to change your text or program once it's typed in). It will also include a new way of compiling your BASIC program. Compiling is the process that turns a BASIC program into the binary code computers understand.

"We've made it so much easier to program graphics," says Chapin. "Our new PICTURE command will be very familiar to Logo users. It allows you to define a picture, then use it as a kind of subroutine. You can rotate it, shrink it, enlarge it and redraw it as many times as you wish."



Data General's full-screen portable.

True BASIC software is being published by Addison-Wesley in early 1985. The first versions, on disk for the IBM PC and the Macintosh, should sell for less than $200. Versions for other home computers will follow.

HEY MOE! GIMME A QUARTER!: Moe, Larry and Curly—those ever-popular Three Stooges of movie and TV fame—are taking their shenanigans into arcades across the U.S. Following success with Stooges' posters, T-shirts, greeting cards, comic books, and a hit record ("The Curly Shuffle"), the slapstick team has an arcade hit. Mylstar Electronics' *Three Stooges* arcade game has the Stooges trying to rescue Nora, Dora, and Cora from the mad doctor I. M. Acad. Moe, Larry and Curly are controlled with three joysticks, so they can defend themselves in typical Stooges style—by throwing pies. These zanies seem to have "slip-on-a-banana-peel" appeal—even when you have to pay.

OPEN THE DISK DRIVE DOOR, HAL: The calendar may say 1985, but the year on the movie *and* video screens is *2010*. Coleco plans to introduce two games based on the holiday sci-fi movie, *2010*. The games, *2010 Strategy* and *2010 Action,* will be available for the Adam and ColecoVision systems.

POWERFUL PORTABLE: Data General has made a big advance in the portable computer field. Its Data General/One portable is an IBM-compatible that comes with two built-in disk drives. But the real news is its tilt-up, full-size, 80-column by 25-line screen. The Data General/One weighs less than 11 pounds. The price tag, however, is hefty— $2,895.

MULTI-PURPOSE MONITORS: Several manufacturers have recently come out with televisions that can double as high-quality color computer monitors. Sears 13-inch Model 4084 sells for $350. The Pioneer SD-25, which costs $1200, features a 25-inch screen and needs add-on modules to be used as a television or RGB monitor. This Pioneer set even has an optional accessory that lets you replace the voice of your favorite rock video star with your own crooning.

JOYSTICKS TO THE WORLD: Want arcade-quality game playing at home? Two new joysticks promise to give you just that. Suncom's TAC-3 features an extra fire button on the top of the stick. It costs $14.95. Video Peripherals, Inc., offers the HS 15, a joystick they claim to be the product of "extensive study in the fields of electronics and human physiology." The HS 15, which sells for $39.95, features a wide, weighted base, two fire buttons and an extra-thick handle. That's state-of-the-art zapping. ⊏

SHOW BEAT

EDITED BY PATRICIA BERRY

DINOSAURS GO DIGITAL

© MCMLXXXIV BUENA VISTA DISTRIBUTION CO., INC.

Going somewhere? Dinosaur roars could make *Baby* a howling success.

Dubbing a dinosaur movie is no simple matter. You can't just have someone standing in the background yelling "Hu-rew! Hu-rew!" every time the brontosaurus has a line.

So what *do* you do? Well, first you call in a few whales, an elephant or two, some camels and hyenas. Then you call in Mark Mangini—and make sure he brings his computer. If he forgets...well, then you have a real zoo on your hands!

The producers of *Baby,* a new Disney film, made sure that Mark brought his computer to work on their movie. *Baby,* due out next month, is about an American scientist's discovery of a modern-day family of dinosaurs living in the African jungle. It stars William Katt (of TV's *Great American Hero*) and Sean Young (Chani in *Dune*). *Baby* is filled with the sounds of dinosaurs—courtesy of Mark Mangini, his partner, George Budd, and their sound effects company, Thundertracks.

Thundertracks' dubbing has been heard in *Raiders of the Lost Ark, Poltergeist,* and *2010*. Mark also worked on the sound effects in *Gremlins,* creating the voices of Gizmo and other gremlins from sounds made by his own baby son.

Baby's dino dialogue began with recordings of real animals—more than 20 of them, including bobcats, hyenas and dogs. Even before the animals were recorded, however, Mark's computer—an Alpha Micro multi-user system—went to work.

First, "we went through the script, logging on the computer all the situations that required dinosaur sounds," Mark explains. "Then the computer organized that information into, say, how many times we needed the dinosaur to make angry, growling sounds, and so on."

Once Mark had the log of all the sounds he needed, it was time to go on a sound safari. He used a highly sensitive microphone to record the sounds of elephants, hyenas and other animals. The results were then entered into the computer: "We're a small company, but we have hundreds of thousands of sounds in our library and listed on our computer."

With the library of real animal sounds, Mark began creating the "voice" of the dinosaur. But how do you create this sound when no human has ever heard a dinosaur?

"I'm still not sure we know," Mark admits. "I have a vague idea of what works dramatically—what dinosaurs *might* really have sounded like. But I've heard that they might not have made any sound *at all*....What we concentrate on is making the most *interesting* sounds," he says. "We created a sad sound, for instance, without even knowing if a real dinosaur could express sorrow."

Mark had to count on experience to carry him through this creative sound-making process. To make an adult dinosaur sound, he and his recording assistant Doug Hemphill began with elephant noises. Elephants make extremely loud sounds, and they have a wide vocal range, says

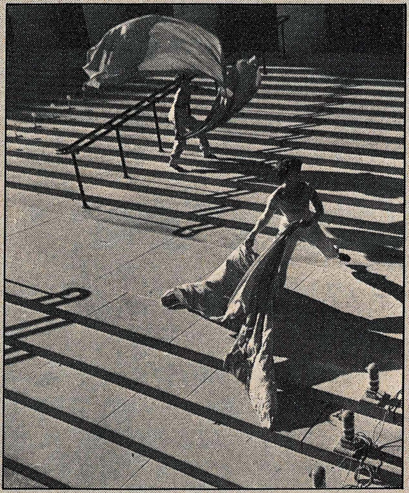
Mark. For the baby brontosaurus sound, Mark started with a camel sound. Of course, he didn't stop with these single sounds. He electronically strung together a number of sounds to get just the right effect.

The computer is used for much of this sound mixing. One sequence may require a hundred different sounds that need to be mixed onto one tape. Mark sits at a computerized mixing console, deciding how to combine the 100 tracks. The computer records every move he's made. That way, changes can be made later in the sound editing process.

There were a number of unique sounds created for this *Baby.* The sound of the mother dinosaur roaring, for example, is actually made up of a sequence of elephant and snow leopard sounds. But Mark's biggest discovery—in more ways than one—was the sound of whales. "It turns out whales have an incredible range of sounds from low groans to super high notes," he says. "They growl, laugh, roar, squeak. They can even make two sounds at one time: a high-pitched squeak and a low groan all at once." Mark adds that the combination of whale and elephant sounds in the voices of the adult dinos "will rumble the theater."

Making the theater rumble with help from a computer is rewarding for Mark. But his very favorite part of the job is being out in the field recording animals. This can be a real adventure. Mark recalls camels who spit at him, and the elephant who almost pinned him to a wall.

Unlike computers, five-ton animals aren't known for being user-friendly.


© DAVID DU BUSC

Computers help stairs "sound" off.

MUSICAL STAIRS: What's more fun than musical chairs? Musical *stairs,* of course! "Soundstair" is just that—a computerized, travelling exhibition that's a kind of musical chairs on stairs.

"Soundstair" was created by Chris Janney, a former MIT (Massachusetts Institute of Technology) artist. To make stairways sing, Janney hooks up a computer, a synthesizer, and a set of photoelectric cells or electronic eyes (like the kind used for alarm systems or automatic doors).

Anytime anyone steps on a "Soundstair" stair, a beam of light is broken. That triggers the synthesizer to play a note, explains Janney.

In a way, "Soundstair" was Chris Janney's introduction to computers. "I don't have an extensive computer background," he admits. "I don't even have an extensive *electronics* background."

So when it came time to build the largely electronic, computer-based system, Janney made use of the people around him. "In a place like MIT—with its computer programmers, engineers and scientists—anything can be built."

Last October, Janney set up "Soundstair" in front of New York City Hall, and Mayor Ed Koch danced a musical jig on the spot. Janney has also taken "Soundstair" to the Spanish Steps in Rome, Italy, and to Boston's Faneuil Hall Marketplace. In Boston, he convinced a mounted police officer to coax his horse up the stairs. Hooves and high notes combined into a kind of high-tech tune.

Chris claims that kids are by far the biggest fans of "Soundstair." Adults stand around "trying to understand the thing," Chris recounts. "And then these kids come whipping right through, and they get it, right away."

Sounds like those kids are the winners of this musical chairs...er, stairs...competition. ◘

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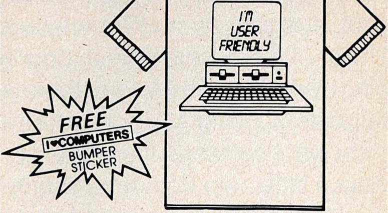

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CONNECTIONS

EDITED BY SUSAN JARRELL

DISAPPEARING COMPUTERS:

A PROGRESS REPORT

"The main thing is not to get discouraged...The challenge to us, as owners of 'gone-but-not-forgotten' computers, is to survive."
Ronald Smith
Worth, IL

Over the past few months, ENTER has tried to keep you up-to-date on new developments regarding so-called "disappearing computers"—including Timex/Sinclair, TI 99/4A, Osborne, Mattel Aquarius and others. In our June issue, we asked those of you who own these computers to let us know how you've been making out. Judging by your letters (and most of them were very encouraging), one thing is certain: there *are* places to go for support, whether you want software, literature, or just a little help from time to time.

With your help, we managed to find a few new sources. We also discovered a couple of interesting developments in the world of "here-today, gone-tomorrow" computing. We hope these tips will help. We also hope you continue to let us know how you're coping.

The Best Resource: Users Groups

One of the best things any computer user can do is join a local users group. These groups are great sources of information. Many of them have software libraries which contain free, or nearly free public domain software, and many low-cost game and utility programs. (TI owners, for example, can get over 400 public domain programs through users groups.) If you can't find a local users group, contact one in another area and ask them for help in starting your own.

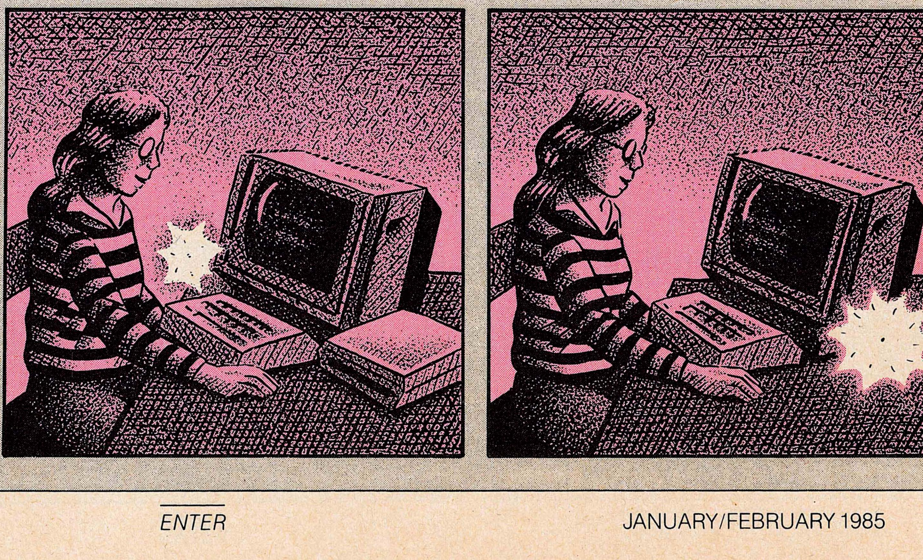
Timex / Sinclair

"Just because Timex has ceased marketing the 1000, 1500 and 2068 doesn't mean that we're going to quit using ours...If we band together and pool our resources, the future can look bright and promising."
Bill Ferrebee
T/S Support Group
Paden City, WV

There are many print resources available for Timex/Sinclair owners. *Syntax* is a useful 12-page monthly newsletter. Subscribers can get back issues of out-of-print T/S publications from Syntax. The publishers also offer substantial discounts on prepackaged software. For $2, you can get a list of vendors who are still carrying T/S software. If you send them a self-addressed, stamped envelope, *Syntax* will also put you in touch with one of the 181 T/S users groups in the U.S. For more information, write: *Syntax,* Boulton Road, Harvard, MA 01451-0667.

SYNC magazine is no longer being published. A new magazine, *T/S Horizons,* will help fill the gap. For subscription information, write to: T/S Horizons, 2002 Summit St., Portsmouth, OH. 45662.

SOFTWARE: *Quicksilva Inc.* has quite a few T/S 2068 action games available through mail order. Prices range from $19.95 to $24.95. For a price and title list which includes *Smuggler's Cove* and *Timegate,* write to: Quicksilva, Inc., 426 West Nakoma, San



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The Timex Company no longer has a toll-free customer service number. If you have questions about service, you have to pay for the long-distance call. You can reach them by calling 203-573-4883.

A Timex/Sinclair *Users Conference* is in the process of being organized for sometime in early 1985. Write to: T/S Support Group, 115 North 7th Ave., Paden City, WV 26159 for updates and more information.

Texas Instruments

Even though Texas Instruments pulled the rug out from under owners of the T I 99/4A, the company is still very much in business. So, if you want to find a dealer who might have T I software left, you can contact the company directly. For those of you who don't have TI's hotline number, it's 1-800-TI-CARES.

As ENTER reported previously, Triton Products bought TI's remaining stock of software and peripherals. Triton has some T I software available, but the supply is limited. Write for a catalogue: Triton, P.O. Box 8123, San Francisco, CA 94128.

The national network of TI users groups are your best bet if you're looking for software. Call the TI hotline and they will send you a free list. Chances are very good that there is at least one users group (and probably more) in your state.

"I think if all the owners of both Timex and Texas Instruments (computers) would just be patient, it will work out for us."

—Dane Stegman
Akron, NY

Mattel Intellivision/Aquarius

Mattel is no longer selling its computer and game player line. However, Intellivision owners *can* look forward to seeing some new software this year. A new company, called Intellivision, promises to begin producing new software for Intellivision systems (including the Aquarius computer and Intellivision game system). For more information, write to: Intellivision, 21535 Hawthorne Blvd, Torrence, CA 90503.

Mattel will continue to handle service warranties. The customer service hotline (1-800-421-2826) says it will attempt to answer any of your questions.

Cezar Industries in San Francisco has taken over the marketing of Aquarius systems and software. According to the company, Mattel has turned over its user lists to Cezar, who will keep Aquarius owners up to date on the company's progress.

Cezar plans to have an Aquarius II system on the market very soon. The company has taken steps to support current and new owners with software and peripherals. For more information, write to: Aquarius, 451 Leahy Street, Redwood City, CA 94062.

Osborne

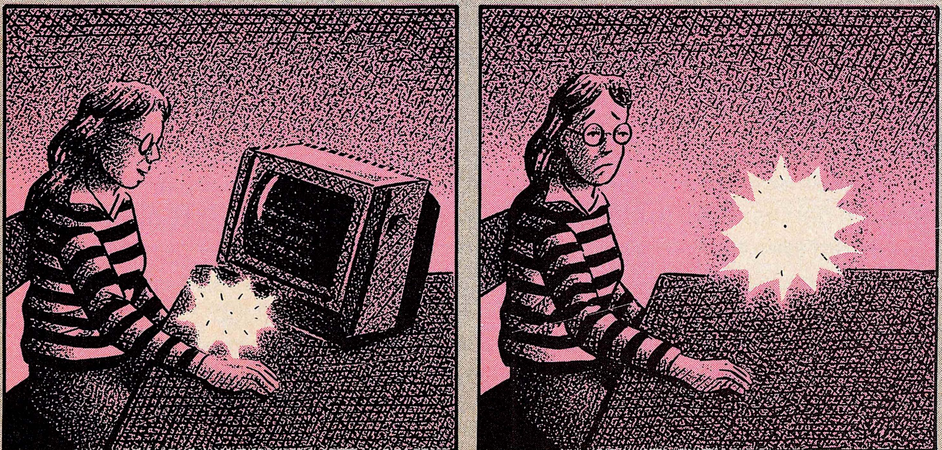
In the down-but-not-out department, Osborne computer owners still have a pretty good chance of getting software. At this writing, the company was still making some software, but what is available is limited to business and utility programs.

In the meantime, the First Osborne Group (FOG) which is the largest Osborne user's group in the country, has hundreds of public-domain programs available. Write to FOG, P.O. Box 3474, Daly City, CA, 94015-0474.

— Jessica Wolfe

Send Us Your Problems And Tips

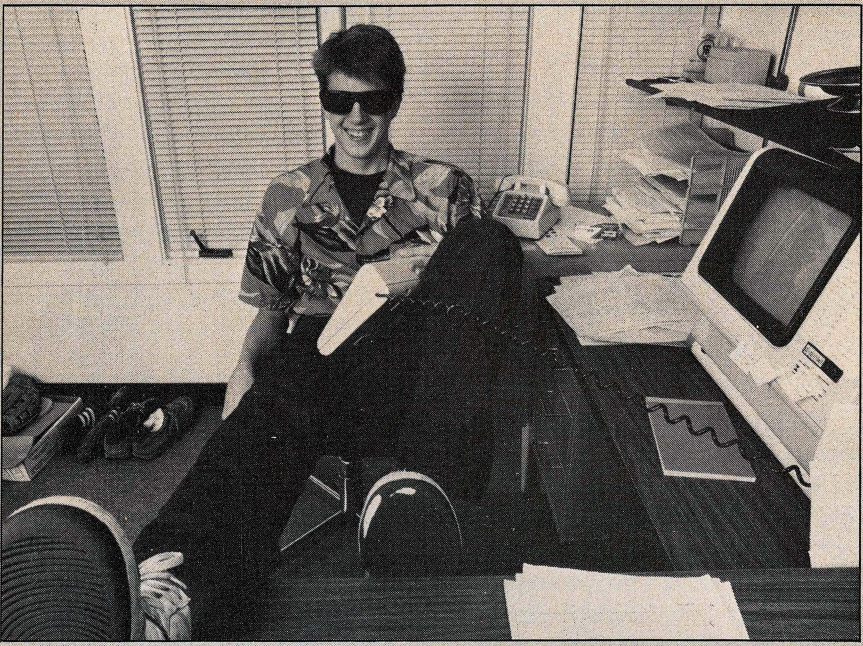
ENTER would like to continue to keep you up-to-date on new resources for "disappearing...and disappeared" computers. If you know of any that we haven't mentioned, write to us at: Disappearing Computers, ENTER, 1 Lincoln Plaza, New York, N.Y. 10023.



PACESETTERS

EDITED BY ELIZABETH HETTICH

TOMAS THE ADVENTURE TESTER


© RALPH MERCER

Risky Business: Tomas, 15, spent his summer debugging Infocom games.

How would you like to spend your summer adventuring through castles or hitchhiking across the galaxy? That's what 15-year-old Tomas Bok did last summer—as a game tester for the Cambridge, Massachusetts, software company, Infocom.

Tomas tested Infocom's new games *Hitchhiker's Guide to the Galaxy* and *Cutthroats*, as well as a software sampler that includes the beginnings of *Zork I & II, Infidel* and *Planetfall*.

"I played adventure games eight hours a day, five days a week—learning every little thing about them," remembers Tomas. "You start out by playing the game until you've completely solved it and know the plot. That's the easy part. After that, you start looking for the bugs."

To find bugs in these text adventure programs, Tomas had to play the game over and over again. He also typed in unusual commands to see how the computer software would respond. "For instance, if you're playing *Zork* and you type in the word *Zork*, the computer responds 'At your service.' Well, there are things like that buried throughout Infocom games. I had to check to make sure everything worked, and was spelled correctly."

Sometimes he'd find bugs that needed major corrections. *Hitchhiker's Guide to the Galaxy*, for instance, was just too difficult when Tomas first tested it. Thanks in part to his suggestions, game designer Steven Meretcky and the game's programmers made big changes before *Hitchhiker* went on sale. Tomas also caught smaller errors, like spelling mistakes.

It was a lucky break that got Tomas the job at Infocom. "My next-door neighbor happened to be dating someone who knows Mark Blank—one of Infocom's game designers," he says. "My neighbor suggested that since Infocom's games are played by kids, it would be good to have someone my age testing them."

Tomas had been programming computers for several years and had played Infocom games. "But I never dreamed that I'd get to work at Infocom with these designers. That was a real thrill for me."

It was also a little intimidating. "I was the youngest person there. There was no one my age to talk to. I felt like an outsider," he recalls. Before long, that began to change. "Everyone was really kind. Soon I was playing softball on the company team. Sometimes I even found myself playing games on the computer until the middle of the night," Tomas remembers. "We would even take Infocom games, change the commands and put in silly jokes."

It wasn't all fun and games, though. "When people hear that my whole job consisted of playing computer adventure games, they always respond the same way: 'Oh boy, real tough job, huh?' What they don't realize is that playing adventure games all day every day really *is* hard work."

And, a real adventure, too.

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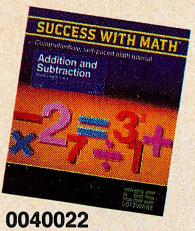
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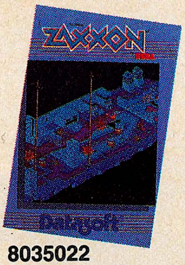
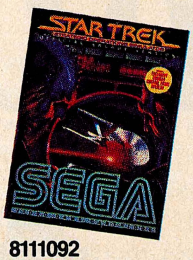

ZAXXON
Datasoft

8035022
Zaxxon
ColecoVision/Adam, C-64: *cart;* Atari H.C.: *disk and cart;* Apple: *disk.*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Star Trek
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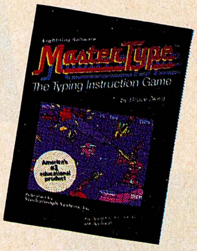
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Master Type
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LOST CAVERNS

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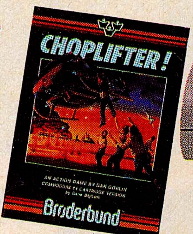
Pitfall II
ColecoVision/Adam, Atari H.C.: *cart;* C-64: *disk and cart.*


CHOPLIFTER!
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Choplifter
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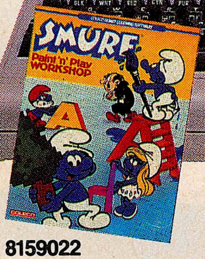
SMURF
Paint 'n' Play WORKSHOP

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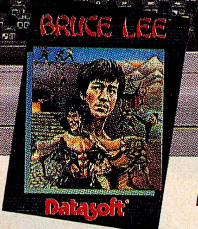
Smurf
ColecoVision/Adam: *cart.*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Datasoft

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Bruce Lee
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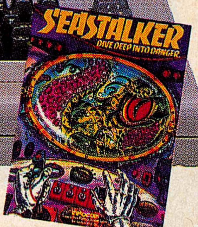
SEASTALKER
DIVE DEEP INTO DANGER

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Seastalker
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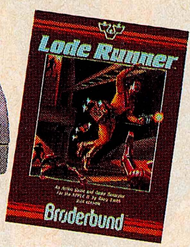
Lode Runner
Brøderbund

8101012
Lode Runner
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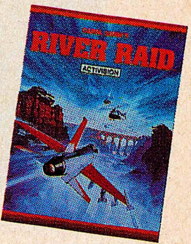
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ACTIVISION

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River Raid
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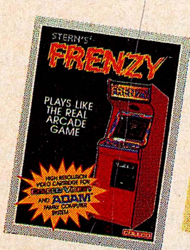
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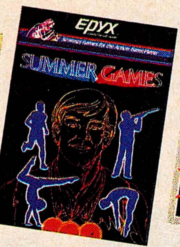
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SUMMER GAMES

8150012
Summer Games
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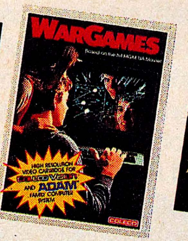
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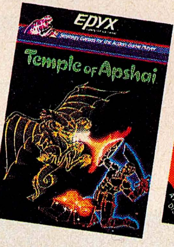
ColecoVision/Adam: *cart.*


EPYX
Temple of Apshai

8102002
Temple of Apshai
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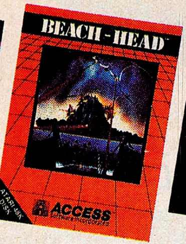
BEACH-HEAD
ACCESS

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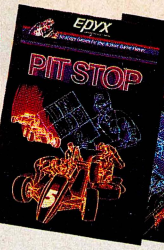
Beach-Head
C-64, Atari H.C.: *disk.*


EPYX
PIT STOP

8103092
Pitstop
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EPYX
STOP II

8229082
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In addition, each issue of the magazine announces the "Pick-Hit Selection"—an outstanding software selection specifically for your system. If you want only this Selection, you need do nothing—it will be sent to you automatically. If you want one of the alternate selections—or nothing at all—just tell us so on the response card always provided, and mail it by the date indicated. You'll always have ten days to make your decision. If you ever receive a selection without having had ten days to decide, you may return it at our expense.

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ROCK Video '84

THE YEAR'S HOTTEST HIGH-TECH MUSIC VIDEOS

Music makes you dream. And in dreams, you can do almost anything—soar and swirl and even change shapes.

In 1984, computers brought some of the year's top music video dreams to life. With help from computers and other high-tech equipment, performers soared and swirled and took all kinds of fantastic shapes.

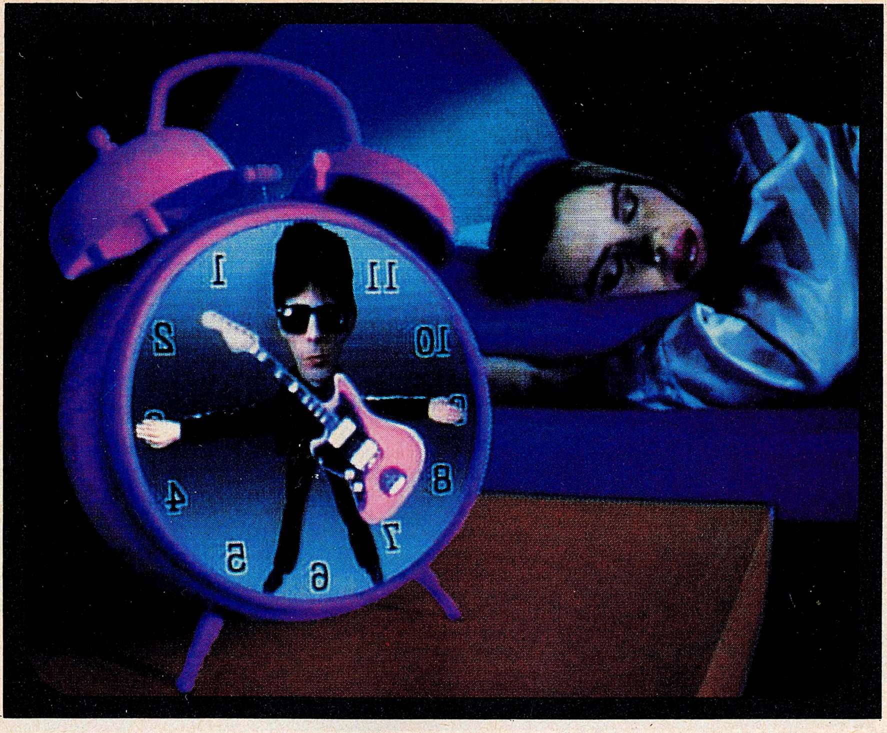
Throughout the year, music stars like The Cars, Cyndi Lauper, Herbie Hancock and Paul Simon worked with special effects experts and graphic computers like the Mirage, the Paintbox and the CBG (*C*haracter *B*ackground *G*enerator). The result: music videos with a high-tech difference. To honor these achievements, ENTER has picked the Top High-Tech Music Videos of 1984.

SWEET DREAMS ARE MADE OF THIS...

"Using the computer helps us make the video into a fantasy," says Ric Ocasek of The Cars. Each of the three computers used in these videos had its own special way of creating fantasy.

- The *Mirage*, for instance, takes "any picture, reduces it to its pixels, and then tells the pixels where to go," according to Stacey Foster of the Broadway Video special effects company. A technician uses the Pascal computer language to plot points that create a design. The Mirage then changes a video image into this design. That's how a normal-looking rock star can suddenly be changed into the shape of a guitar.
- The *Paintbox* changes the color of anything or everything in a video. This system's software, monitor and very large graphics tablet (about 1½ feet by 2 feet) can also be used to animate video images.
- The *CBG*'s 240K memory can put as many as 5,000 different colors on screen at the same time. The CBG's graphics program can also shrink, tilt, rotate or zoom in on any video image.

Even the most astounding computer, however, won't make a bad song into a great video. That's why



© CHARLEX

THE CARS: *"YOU MIGHT THINK"*

we looked for an inspired mix of images and music in picking our Top High-Tech Music Videos. Here are the '84 videos we think make the best use of computers, robots, and other technology to add fantasy and excitement to the music on the screen.

THE CARS: "You Might Think" *(Elektra Records)*. In this video, The Cars' lead singer Ric Ocasek turns up as everything from a periscope to a buzzing bee to the hands on an alarm clock. And it's all done with help from Paintbox.

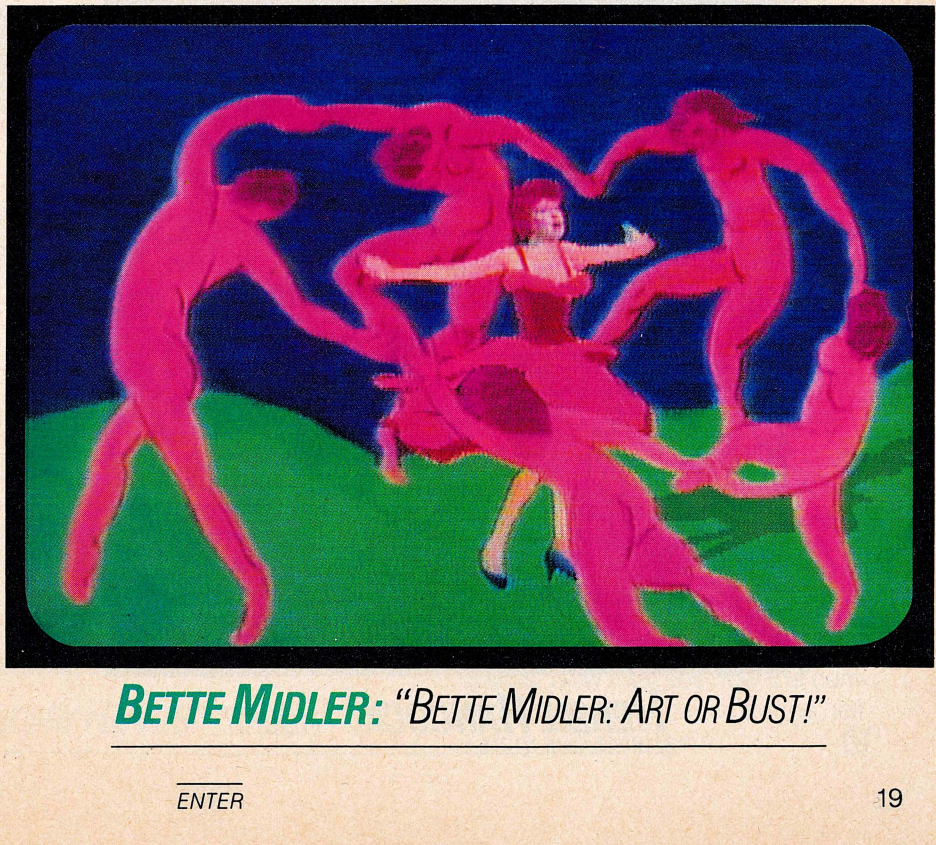
"We use our tools to create reality," says Alex Weil of Charlex, the special effects production company that created these scenes.

Here, for instance, is how they turned Ocasek into the hands on an alarm clock. First, a photo was taken of the scene—with a stand-in alarm clock on the bedside table. Then, the video was shot *minus* the alarm clock. With the photo as a guide, the artists at Charlex used Paintbox to paint a pastel-colored alarm clock into the scene. Paintbox was then used again to put Ocasek onto the face of the clock, to animate his arms, and to make the clock jump up and down.

Charlex, explains Alex Weil, paid close attention to detail. "When the clock jumps, so does the shadow," says Weil. "If the lighting were off even a tiny bit, you'd notice. That's the special effects tip off. When the alarm clock jumps, the shadow responds as it would in real life."

The "You Might Think" video single isn't the only Cars' video with high-tech effects. The group's entire video album, *Heartbeat City*, is filled with computer-generated effects created by the technical experts at Charlex. In the video album's opening sequence, for instance, some world-famous landmarks are transformed with the help of a Paintbox and a Mirage-like system called the ADO (Ampex Digital Optics). These computers replace the faces on Mount Rushmore—Washington, Jefferson, Lincoln and Roosevelt—with The Cars' faces. And they turn the Flatiron Building in New York into a giant ironing board.

"We even got our name in," says Charlex's Alex Weil. The final scene is in front of a hotel whose computer-generated name just happens to be The Charlex.



BETTE MIDLER: *"BETTE MIDLER: ART OR BUST!"*

ROCK Video '84

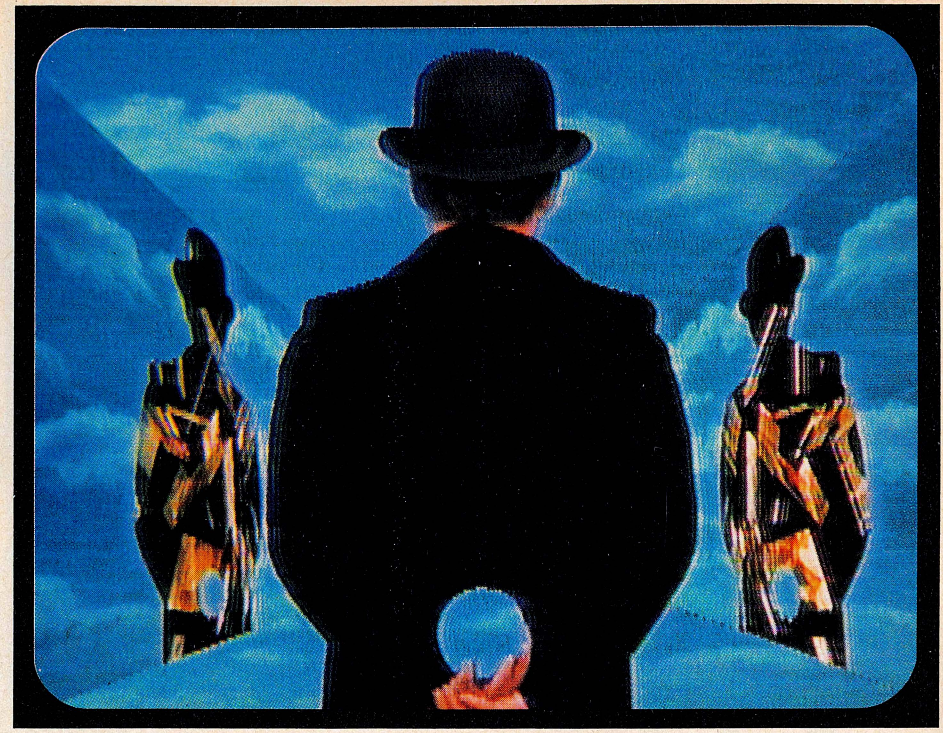
BETTER MIDLER: *"Bette Midler: Art or Bust!"* *(HBO)*. Bette looks divine all through her HBO concert—thanks to The Paintbox.

There's no downtime between Bette's songs, because almost every tune ends with a scene painted using the Paintbox. The painted scene dissolves into the real-life performance of the next song.

To make these transitions work perfectly, "every fifth frame was painted [with Paintbox] and edited together," says Stacey Foster of Broadway Video. That's how Bette can end a song wearing one outfit, and begin the following song dressed in something different.

What does the Divine Miss M think of all this?

"They want me to operate a computer," says Bette. "I can't even plug in my toaster!"


© 1982, 1984 PAUL SIMON

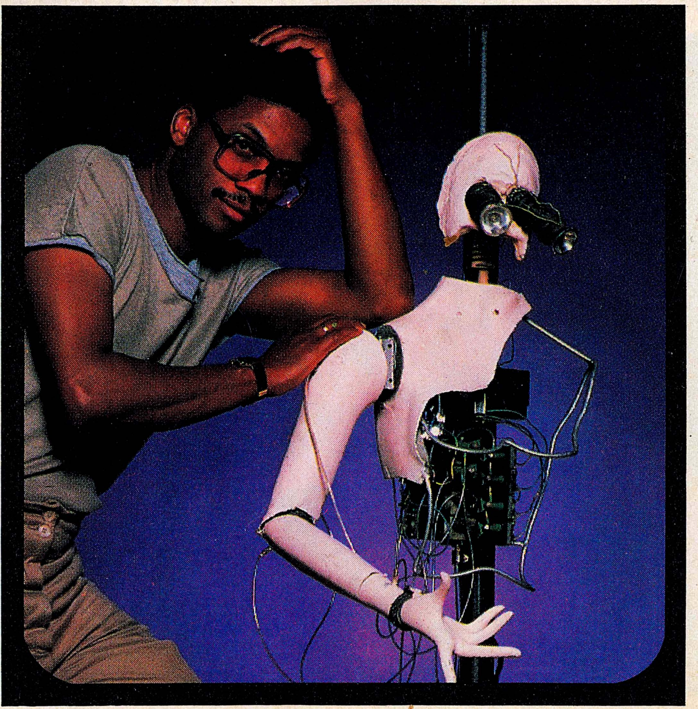
PAUL SIMON: *"RENE AND GEORGETTE MAGRITTE WITH THEIR DOG AFTER THE WAR"*

HERBIE HANCOCK: "Rockit" *(Columbia Records)*. "Rockit," which features dancing robot legs and spacey sounds, may *look* incredibly high-tech. But looks are deceiving. The only computer used in this music video was the Apple IIe, which controlled a Rhodes Chroma keyboard synthesizer. Still, this video's playful, high-tech touches give it a spot among our music video picks.

As this video begins, you enter a normal-looking house and are suddenly surrounded by all kinds of robots. They look sensational—but these aren't real mechanical robots. English designer Jim Whiting calls them Unnatural Bodies, and that's just what they are. These human-looking "beings" were operated manually off-camera.

The Unnatural Bodies even have names: Veronica the Housewife, The Business Man, The Baby and The Pervy Men (a crazy chorus line of headless male mannequins suspended in mid-air.)

"We needed something unusual," says Herbie's associate record producer Tony Meilandt. "There aren't life-size, human-like robots on the market. Creatively, these were just what we wanted."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HERBIE HANCOCK: *"ROCKIT"*

COURTESY OF CYNDI LAUPER, AND PORTRAIT RECORDS, CBS

CYNDI LAUPER: "GIRLS JUST WANT TO HAVE FUN"

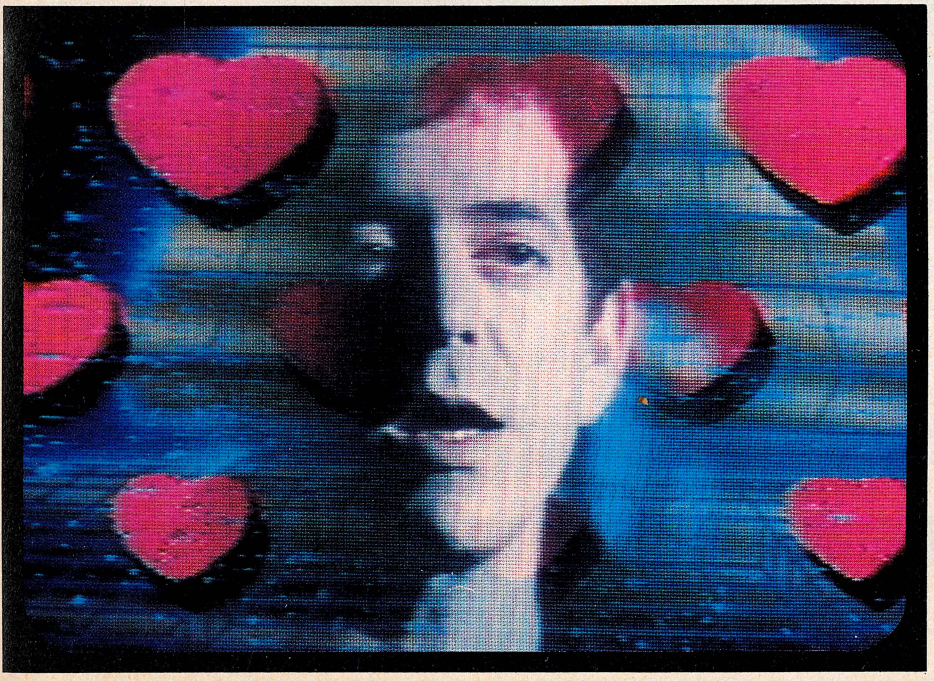
PAUL SIMON: "Rene and Georgette Magritte With Their Dog After the War" *(Warner Brothers Records)*. Rene Magritte was an artist who created remarkable pictures with paint on a canvas. In Paul Simon's musical tribute to this artist, the Mirage was used to recreate some great Magritte paintings on a screen.

In the beginning of the song, for example, a picture of Simon takes the shape of a keyhole that seems to float in the air. This image stood still in Magritte's work. It can move here with help from the Mirage.

In the video's very last scene, a recreated Magritte painting is changed into brilliant, bursting fireworks. Broadway Video tech expert Stacey Foster explains that this was done by using the Mirage to break the picture into individual pixels "verrrry slowly."

CYNDI LAUPER: "Girls Just Want To Have Fun" *(Portrait/Epic Records)*. This video bounds along with Cyndi's "so unusual" brand of fun, but without many special effects—until the very end. That's when director Ken Walz uses the Mirage to float Cyndi and friends away in a giant bubble.

Once the video was shot, programmers wrote code that created the shape of the bubble. The Mirage then put Cyndi's video image together with the programmed bubble shape. When Cyndi and company drifted off above the streets of New York, says Walz, it marked the first time the Mirage was ever used in a music video.



MARTY ABRAHAMS, DIRECTOR, WAYNE HYDE, EDITOR/EDITEL

LOU REED: "LEGENDARY HEARTS"

LOU REED: "Legendary Hearts" *(RCA Records)*. As Lou sings his heart out on this tune, he's suddenly surrounded by video hearts. The hearts weren't there when he started. They were added with a CBG after the performance.

Judy Zahn of Editel, another video production company, was given an early version of Lou's video and told where to put in the hearts. She created these and other fanciful images on the CBG. When the final video was ready, the CBG hearts were added in.

All through 1984, computers changed the shape of music video images. At the same time, music videos were returning the favor. These high-tech videos are helping change the image of computers, according to rock photographer/video maker Lynn Goldsmith:

"In the past, people have been turned off by the idea of special effects. Now they see how the computer can help enhance songs, tell a story and entertain."

GREATS & GLITCHES

THE ENTER AWARDS FOR 1984

The Oscars, the Emmys, the Grammys and now....

The ENTER Awards, 1984.

Some very good things happened this year in the field of computers and new technology. At ENTER, we felt it was important to recognize these real achievements of 1984—great hardware and software, exciting high-tech happenings and people. We also couldn't resist naming some of the year's great glitches—dubious achievements with a high-tech twist.

All winners were chosen by the ENTER staff from nominees suggested by readers, youth advisors, advisors, and contributing editors. And now, without further ado: The First Annual ENTER Awards.

A Computer That Changed The Way We Look at Computers

THE MACINTOSH *(Apple Computer Co.)* "It's an incredible machine. It bridges the gap between people and computers because it is so easy to use. Yet, with its 32-bit microprocessor and other features, it offers more advanced users a great deal, too. It's a machine that's going to be around for quite a while."*—Greg Trautman, 17, Youth Adviser.*

From Hi-Res to "The A-Team"... On a Single Screen

THE RGB MONITOR AND TV *(Sears and other manufacturers).* "This high-resolution color monitor is also a regular TV set. It costs half of what other RGBs cost. When you get done with your computer work on the excellent monitor, you just flip a switch and watch TV. If you're thinking about buying a TV set, think about getting this instead."
—Joan Targ, Advisor.

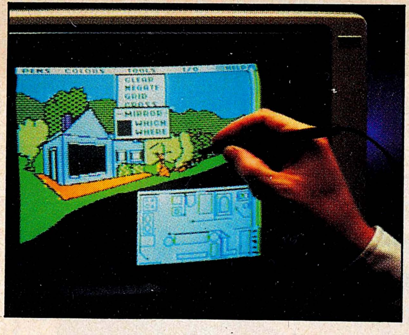
The Prints and the Pauper

OKIMATE 10
THE PERSONAL COLOR PRINTER
OKIDATA

LOW-COST PRINTERS "With new low-cost machines like Okidata's Okimate and the Centronics GLP, printers are much more affordable. As technology improves, prices should continue to come down, letting everyone have his or her own typesetter right at home."
—Richard Chevat, Technical Editor

The Light, Fantastic!

GIBSON LIGHT PEN *(Koala Technologies).* "A thoughtfully designed, quality light pen that is very easy to han-

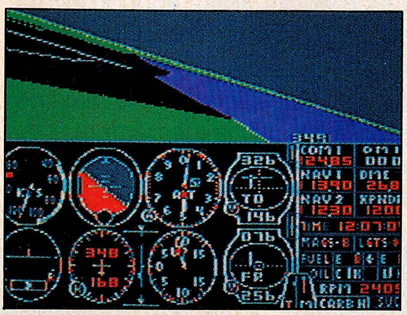


dle. It's more expensive than many other light pens. But if you're into serious computer graphics applications, you won't be wasting the unique power that you're paying for."—*Hilde Weisert, software reviewer.*

Not Just Another Pretty Typeface

THE PRINT SHOP *(Broderbund).* "Exceptional. It offers such a rich variety of different type styles and designs. You can use it to make invitations, cards, letterheads... anything you can imagine. It shows people something really useful they can do with their computers." —*Phil Wiswell, Contributing Editor.*

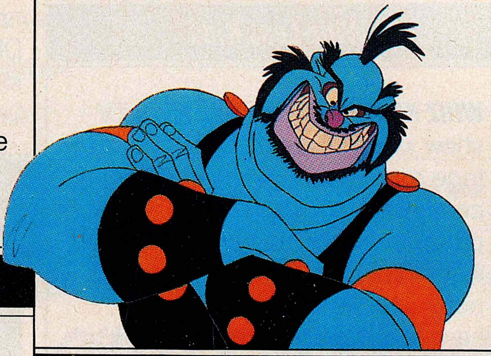
1984 Games We'll Still Be Playing in 1985



SPACE TAXI *(Muse Software).* "An unforgettable cab ride..."
OIL'S WELL *(Sierra).* "A drill...uh...thrill a minute..."
FLIGHT SIMULATOR II *(SubLogic).* "A challenge to any flying ace..."
SUMMER GAMES *(Epyx).* "Deserves an Olympic medal..."
KINGS' QUEST *(Sierra).* "The first-ever animated graphic adventure..."

Disc and Dirk Go To The Arcade

DRAGON'S LAIR & LASER DISC GAMES "Really opened up a new level of arcade games. Even though *Dragon's Lair* seems almost primitive compared with current disc games, it was a breakthrough. I hope they're able to do more." —*Eric Babinet, 16, Youth Advisor.*



A Helping Hand

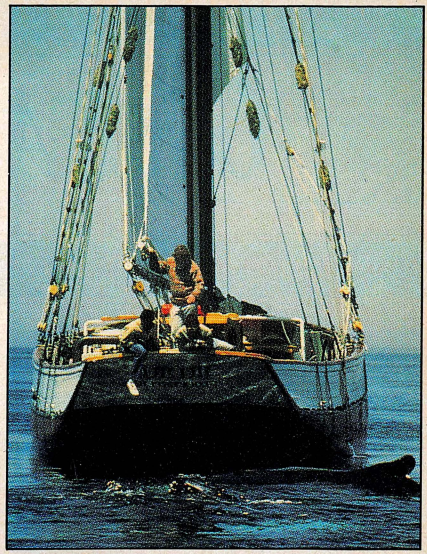
THE NATIONAL CENTER FOR MISSING CHILDREN "This and similar organizations are using computer databases to help find missing children fast. Computers can check fingerprints and other databases instantly. That job could take a person weeks or months to do. The speed of a computer makes a difference."—*Patricia Berry, Associate Editor.*

The Mouse That Roared

COLOR PAINT *(IBM).* "A good program that does things that MacPaint does on the Mac, but it's in color on the IBM PC and PCjr. A high-resolution program that's just terrific."—*Joan Targ, Advisor.*

Whale of a Tale

THE VOYAGE OF THE MIMI *(Bank Street College and Holt, Rinehart & Winston).* "This project was a good attempt to combine a TV show [about a whale-watching expedition] with software and information about science. Combining these different elements was an exciting beginning."—*Dan Watt, Advisor.*



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"Special Effects So Special You Couldn't Tell" Award

DIGITAL SCENE SIMULATION℠ BY DIGITAL PRODUCTIONS, © 1984

THE LAST STARFIGHTER *(Lorimar Pictures).* "The movie was fun, and the graphics were impressive—especially the space ships that were created with the Cray computer." —*Dan Lhamon, 14, Youth Advisor.*

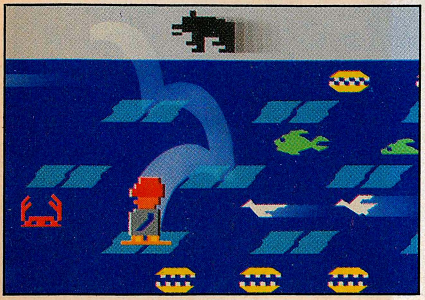
The Best Medicine

COMPUTERS IN MEDICINE "New technology is helping the disabled. Ray Kurzweil's Reading Machine can read almost any book to the blind. Dr. Jerrold Petrofsky of Wright State University uses computers to help paralyzed people take first steps. And surgeons like Dr. Hector James use lasers to perform operations."—*Jim Lewis, Senior Editor.*

THE ENTER AWARDS FOR 1984

GREATS & GLITCHES

Hopping Madness!



Q*BERT CLONES. "Games like *Flip and Flop, Frostbite,* and *Juice* tried to hop on the bandwagon of *Q*Bert*'s success. The ones that aren't very good are just trying to make money off someone else's idea."*—Scott Rose, 12, Youth Advisor.*

Which Planet Are You On?

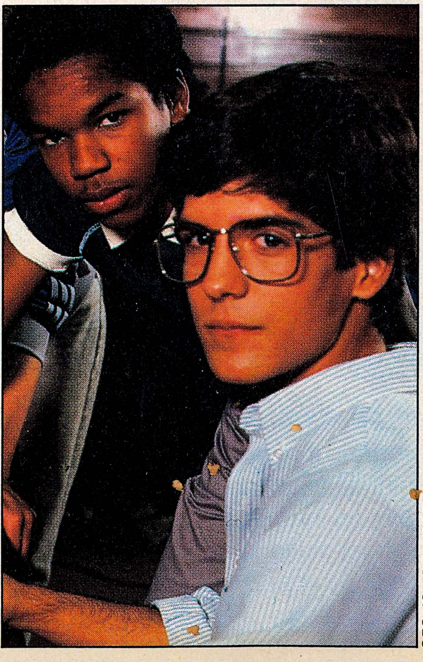
THE NBC NEWS' SPINNING GLOBE. "The opening credits for NBC News programs featured a computer-generated planet Earth spinning around. An alert viewer noticed that the planet was spinning backwards....Oops! I think it cost NBC about $50,000 to correct the mistake and get the Earth spinning the right way."*—David Powell, Contributing Editor.*

Small Is Beautiful, But This Is Ridiculous

PORTABLE COMPUTERS WITH TINY SCREENS. Carryable computers have made it possible to compute on the run—and that's good. But they've also caused a lot of eyestrain. And that's bad. "You can't see what you're typing, and so you forget what you said. They just drive me totally crazy."
—Elizabeth Disney, 14, Youth Advisor.

Whiz-Less Kids

WHIZ KIDS *(CBS Television).* "This TV show was ridiculous. It took advantage of the hype and hysteria about computer break-ins and software piracy.... And it reinforced the stereotypical image of the computer user as a genius. People have to understand that you don't have to be a genius to use a computer....Besides, the show was boring, and not funny at all."
—Greg Trautman, 17, Youth Advisor.

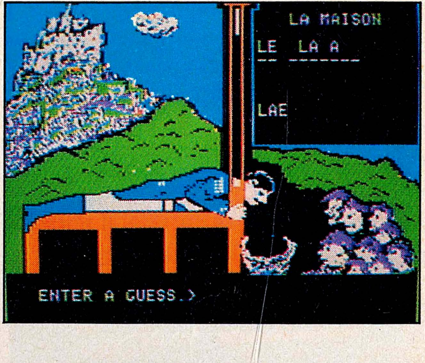


COURTESY OF CBS

Hit the DEC! Here Comes The Governor!

DEC COMPUTERS IN SCHOOL? "The Governor of New Hampshire tried to convince the state and the board of education to put DEC computers into third, fourth and fifth grade classrooms. There's no software for kids on these computers. There's no reason for schools to have DECs. It was a dumb idea that fortunately was defeated by the Legislature."*—Dan Watt, Advisor.*

The Software Least Likely to Foster Cross-Cultural Understanding



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LA MAISON
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LAE
ENTER A GUESS.>
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LA GUILLOTINE *(Gessler Educational Software).* "In this 'educational game,' your character lies in a guillotine as you try to spell out French words. Make enough errors, and the blade falls and slices off his head. You even get to see the head plop into the basket! There *must* be better ways to use the computer to teach languages."*—Ira Wolfman, Editor*

Are Those Chiclets on the Keyboard?

THE ORIGINAL IBM PCjr KEYBOARD. "The junior's keyboard—with its tiny chiclet keys that didn't have any letters on them—was one of the worst. Thankfully, IBM realized the mistake and has replaced the originals with a PC-like keyboard."
—Phil Wiswell, Contributing Editor.

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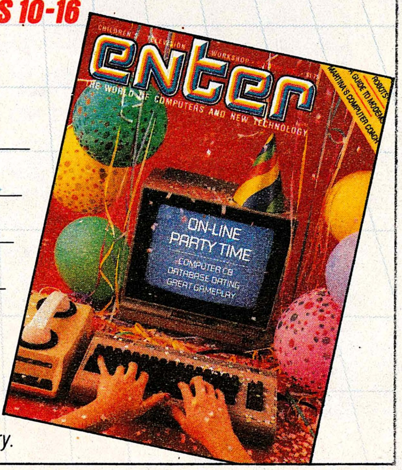
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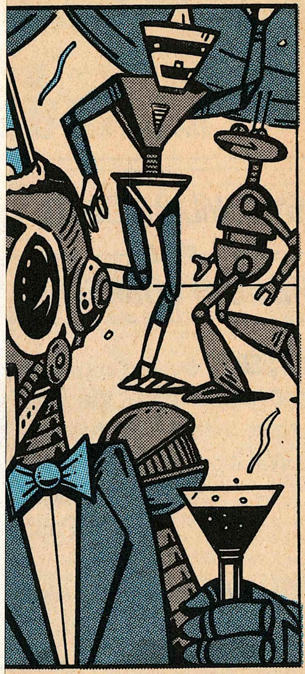

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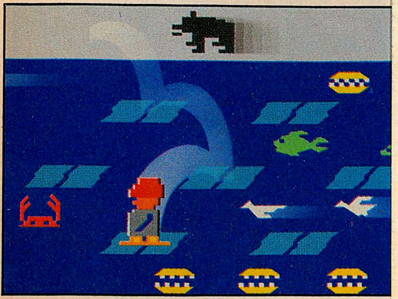
Hopping Madness!



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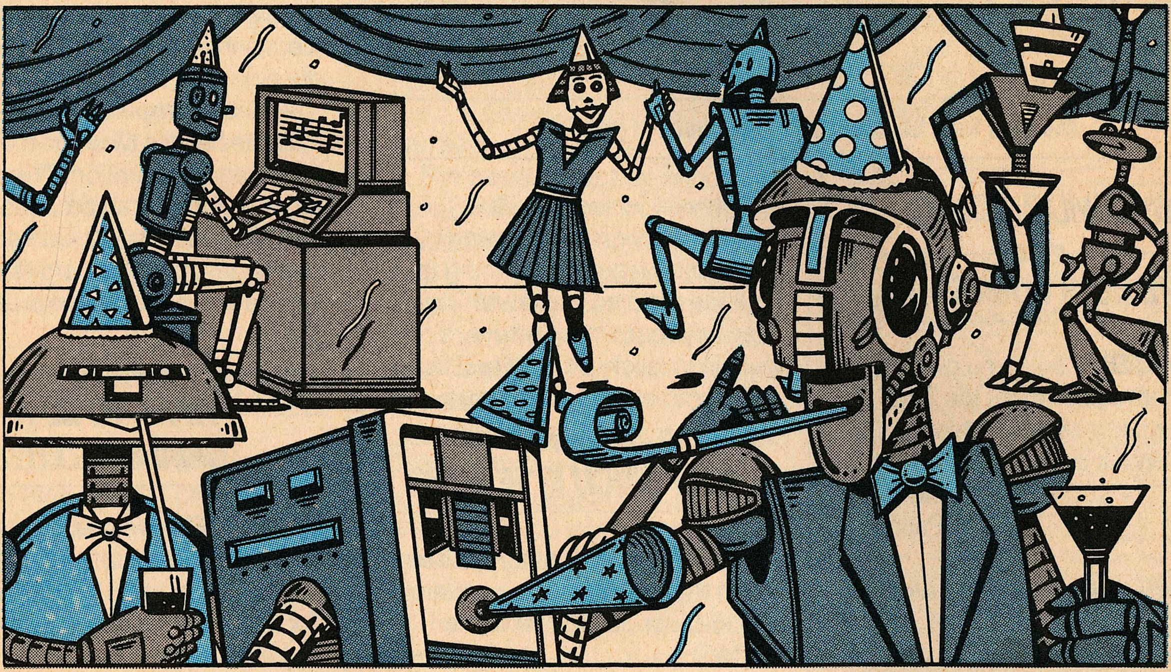
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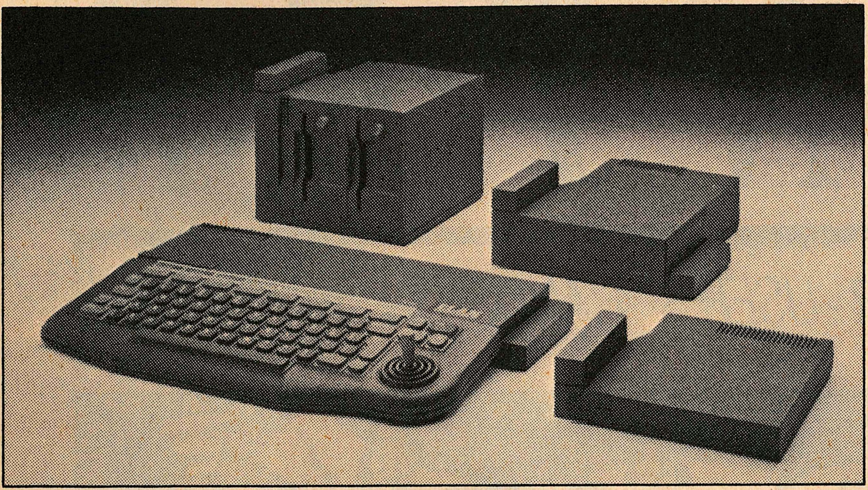
ANSWERS/NEXT: Coming Attractions. 40

ASK ENTER



The Elan from England: 64K and a built-in joystick.

BY DAVID B. POWELL

THE ELAN COMPUTER

DEAR ENTER: Could you give me any information about the Elan Enterprise, a new British computer? Will it come to the U.S.?

—William Figueroa
El Paso, TX

DEAR WILLIAM: The Elan Enterprise computer, which was announced last winter, is not available yet in the U.S. The company hopes to have models here by early 1985. Below are some of the details of the computer as it is advertised in Great Britain. Keep in mind that the product sold here may be different.

The Enterprise comes in 64K and 128K RAM models. The 64K version costs about $270. Both models display graphics in 256 colors, and generate music with up to four simultaneous tones.

Software includes built-in BASIC and word processing. Forth and Lisp programming languages are also available. The Elan keyboard has 69 keys, a built-in joystick, and several user-programmable function keys.

HOW MUCH IS 16 BITS?

DEAR ENTER: What does it mean when they say some computers are 16-bit or 32-bit? Which is better?

—Katie Schein
Chicago, IL

DEAR KATIE: Computers know nothing about letters, numbers, sounds and colors. They work with only one kind of information—"bits." Each bit is an electronic signal that is either "on" (represented by the number 1) or "off" (represented by 0). Every character, number or command you feed your computer has to be translated to a string of bits before the computer can make sense of it.

Most computers use eight bits to define each character or number. But when you talk about an "eight-bit computer," you're not discussing how many bits per character. Those numbers refer to the amount of information a computer can process at one time. Most inexpensive home computers, like the Commodore 64, are eight-bit machines. That means their processors can handle eight bits at one time.

A 16-bit computer, like the IBM-PC, can handle twice as many bits in each operation. The more bits a machine can process at one time, the faster it works. Recently, 32-bit computers like the Macintosh have come on the market.

WANT TO BE A GAMEBUSTER?

DEAR ENTER: I've heard that game makers have people play-test their games. I would be grateful for any information about becoming a game tester.

—Leal Jamais Harris
Newberry, OR

DEAR LEAL: Yes, many companies use game testers. A tester might be asked to comment on manuals and instructions, to suggest changes, and even to try to make game software "crash." A tester may play the games at the company headquarters, or may receive them in the mail.

The best way to get to be a

game-tester is to write the software company a letter. Tell them your age, name, address, telephone number. Also let them know which computer and peripherals you own, and the types of software you have used. It helps if you already know and like a company's games.

Here are a few companies to get you going:

- Testing Department, Broderbund, 17 Paul Dr., San Rafael, CA 94903.
- Product Testing Manager, Infocom Inc., 55 Wheeler St., Cambridge, MA 02138.
- Product Testing, Avalon Hill, 4517 Hartford Rd., Baltimore, MD 21214.
- Software Acquisition Manager, Epyx, 1043 Kiel Ct., Sunnyvale, CA 94089.
- Ultrasoft, 2509 152nd Ave. NE, Suite E, Redmond, WA 98052.

For other companies, address your letter to Testing Department.

JOYSTICK PORT OUTPUT

DEAR ENTER: Is there any way to use the Atari joystick ports for output purposes? How can I do it?

—Alberto Ferrer
Guaynabo, P.R.

DEAR ALBERTO: This question is not as unusual as it may sound to some readers. Several manufacturers are already hooking printers, modems and disks to the Atari through the joystick port.

At least four of the joystick port's nine pins can handle either input or output. The trick is to know how to PEEK and POKE special memory locations, and to get appropriate cables (available at Radio Shack stores).

Atari dealers can sell you a manual which gives more information. It's called Technical Reference Notes and costs $30. But this isn't a manual for beginners. You'll need advanced technical knowledge to understand it.

AN APPLE ON YOUR IBM?

DEAR ENTER: Is there anything that could let an IBM PC play Apple games? If there is, could you tell me more about it and how much it costs?

—George Sun
Cherry Hill, NJ

DEAR GEORGE: It's tricky to get Apple programs to run on IBM's. But it *is* possible with special hardware or software.

The best product we know of for doing this is something called the Quadlink. The Quadlink is a 64K Apple computer mounted on a single IBM PC card. You plug it into your IBM and you can switch back and forth from one computer to another.

However, the Quadlink costs $680. At that price, you could almost buy a regular IIe. If you're interested, you can contact Quadram Corp., 4355 International Blvd., Norcross, GA 30093.

There are also software products available that translate Apple *files* for IBM use. (But you can't use them to translate most store-bought software.) One is called Apple-To-IBM-PC-Or-XT File Transfer Program ($130). It is sold by Personal Computer Products, 1400 Coleman Ave., Suite #C-18, Santa Clara, CA 85050. ▣

If you have a question about computers or video games we'd like to help. Just send your questions to: Q&A, ENTER Magazine, CTW, 1 Lincoln Pl., NY, NY, 10023.

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Be sure that Enter moves with you. Please attach a copy of the mailing label from this issue of Enter and mail it to us at:

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BOULDER, COLORADO 80321

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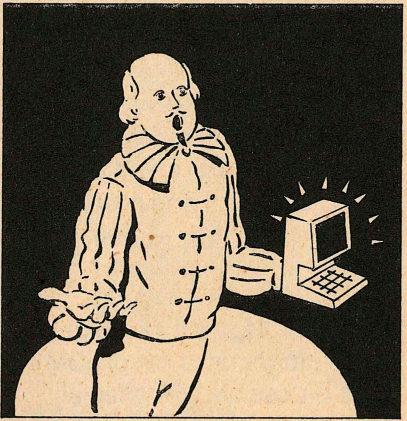
BASIC TRAINING

PROGRAMS FOR YOUR COMPUTER

Apple, Adam, Atari, Commodore 64, IBM, TI 99/4A, Timex-Sinclair, TRS-80, VIC-20



ILLUSTRATIONS © MIN JAE HONG

"Friends, ROMans, Programmers, lend me your expansion slots! I come to debug BASIC, not to crash it. Out, darn bug! A mouse, a mouse, my keyboard for a mouse! Alas, poor joystick, I knew it well, Horatio. What light on yonder monitor glows? It is DOS, and Juliet has CP/M."

In our ongoing effort to raise the cultural level of ENTER, we decided to begin this month's BASIC Training with the famous balcony scene from William Shakespeare's tragedy, *MacBit*. (Or was that *The Modem of Venice*?)

You've probably noticed that BASIC Training is in a new part of the magazine. Starting this month, it joins our helpful tips column, Ask ENTER, our puzzle page and other useful features in our new16-page ENTER CENTER section.

You'll also notice that this month's BASIC Training includes program adaptations for all TRS-80 models and for Microsoft Basic (which runs on Kaypro, Osborne and several other computers). Because of limited space, we can't always print programs for these computers. But we will cover them as often as possible.

Don't forget, even though BASIC Training has moved, it still contains the usual assortment of great programs, the BASIC Glossary, a new Challenge and much more.

On the next page, BASIC Recommends reports on software for Commodore 64 sprite programming. And also in this issue, BASIC Plus contains the second part of our introduction to Assembly language.

But please, while you're having fun with your computer, don't forget these immortal lines:

"Videodisc, videodisc, wherefore art thou, videodisc?"

—Richard Chevat, Technical Editor

CIRCLE FLASH: TRS-80 COCO

The TRS-80 Color Computer has a handy CIRCLE command. This program makes good use of it. Just type it in and RUN it. You'll see circles grow and shrink before your eyes.

Can you create a program that does the same thing with a square or rectangle? What about other geometric shapes? You could also write a subroutine that lets you control the speed and direction of the circles with a joystick.

Try combining these graphics effects with sound. Or see if you can invent a game that uses all of these ideas.

```
10     DATA 5,10,20,30,50,70,100
20     PCLEAR 7
30     PMODE 0,1:PCLS
40     PSET (128,96)
50     SCREEN 1,1
60     FOR P = 2 TO 7
70     PMODE 0, P:PCLS
80     READ R
90     CIRCLE (128,96),(R)
100    NEXT P
110    FOR S = 1 TO 200:NEXT S
120    PMODE 0,1
130    SCREEN 1,1
140    FOR S = 1 TO 120:NEXT S
150    FOR P = 2 TO 7
160    GOSUB 220
170    NEXT P
180    FOR P = 7 TO 1 STEP -1
190    GOSUB 220
200    NEXT P
210    GOTO 120
220    PMODE 0,P
230    SCREEN 1,1
240    FOR S = 1 TO 80:NEXT S
250    RETURN
```

—Daniel E. Cohen

NOISE MAKER: COMMODORE 64 AND VIC-20

Sure, you can *draw* on your computer screen with a joystick (see, for example, our "Sketchman" program this month). But have you ever seen a program that lets you make *music* with a joystick? Of course, not all the sounds this program creates will be music to everyone's ears, but there's no accounting for taste.

Just run "Noise Maker" and push the joystick in different directions for different sounds. Push the fire button to change the pitch of the sounds. This program would make a great sound routine in a game or graphics program. Note: the VIC-20 version does not use the joystick. Hit keys G, H, K and L to produce the sounds. Hit the space bar to change the sounds.

Noise Maker was written by Charles Ardai, 14, of New York City.

COMMODORE 64:

```
10    PRINT CHR$ (147)
20    PRINT TAB(211)“NOISE
      MAKER”
30    S=54272:FOR X=S TO S+24
40    POKE X,0:NEXT
50    POKE S+24,15
60    HF=INT(RND(1)*80)+10
70    LF=INT(RND(1)*255)
80    P=PEEK(56320)
90    IF P=127 THEN 80
100   IF P=111 THEN 60
110   IF P=126 THEN
      WV=128:AD=145:HF=HF
      +10
120   IF P=123 THEN
      WV=32:AD=96:HF=HF-5
130   IF P=119 THEN
      WV=16:AD=142:HF=HF
      +5
140   IF P=125 THEN
      WV=16:AD=6:HF=HF-10
150   IF HF<10 THEN HF=HF+25
160   IF HF>90 THEN HF=HF-25
170   POKE S,LF:POKE S+1,HF
180   POKE S+5,AD:POKE
      S+6,AD
190   POKE S+4,WV+1
200   FOR Z=1 TO 300:NEXT
210   POKE S+4,0
220   POKE AD,0:GOTO 80
```

VIC-20:

```
10    PRINT CHR$(147)
20    PRINT TAB (50) “NOISE
      MAKER”
30    T=36874:A=T+1
40    S=T+2:N=T+3:V=T+4
50    FOR X=T TO V
60    POKE X,0:NEXT
70    POKE V, 15
80    P=INT (RND(0)*103)+138
90    GET K$
100   IF K$=“” THEN FOR X=1 TO
      V:POKE X,0
110   IF K$=“” THEN 90
120   IF K$=“  ” THEN 80
130   IF K$=“G” THEN POKE T,P
140   IF K$=“H” THEN POKE A,P
150   IF K$=“J” THEN POKE S,P
160   IF K$=“K” THEN POKE N,P
170   FOR SR=1 TO 300:NEXT
180   FOR PL=T TO V:POKE
      PL,0:NEXT:POKE V, 15
190   GOTO 90
```

—*Charles Ardai*

(BASIC Training continues on next page)

BASIC RECOMMENDS

One of the Commodore 64's best features is its sprite chip. This allows you to program and animate up to eight small graphic figures. However, programming those sprites can be a long, tedious job. The worst part is probably designing the sprite itself. First you have to plot out each pixel on a 24 by 21 grid. Then, you have to translate all those dots into numbers in DATA statements.

There are a few software packages around that will help you through this process. The best that we have seen is called *Spritemaster*.

This software allows you to draw sprites with a joystick on an easy-to-see screen display. You can easily erase all or part of your design, see how it looks in different colors, and save up to 160 sprites right on the *Spritemaster* disk. Once you have finished, *Spritemaster* will figure out the correct DATA statements and add them to the end of your BASIC program.

Spritemaster makes it easy to design several sprites for an animation sequence. Once you have one sprite ready, you can save it, then change it slightly in a second version, save that, and so on. Then *Spritemaster* will animate your sprites, displaying them in any sequence you wish, at different speeds.

Spritemaster is a product of Access Software, 925 East 900 South, Salt Lake City, Utah 84105. It sells for $39.95.

(BASIC Training cont. from previous page)

MERCURY MONITOR:

ADAM, APPLE, ATARI, COMMODORE 64, IBM, MICROSOFT BASIC, TI 99/4A, TIMEX-SINCLAIR, TRS-80, VIC-20

The thermometer says it's 30 degrees outside, so you'd better put on your winter jacket, right? But in most parts of the world, 30 degrees means it's time to get out the sun tan lotion and head for the beach. Are we talking about strange lands where people like to go swimming among icebergs? No, it's just that in most countries, 30 degrees means 30 degrees *centigrade*—which is 86 degrees Fahrenheit.

Centigrade is the metric system of temperature measurement. The United States is one of the few countries in the world where it is not commonly used. But as the country slowly switches over to metric, you'll probably be seeing centigrade temperatures more and more.

How will you know whether it's time to go to the beach or put on your parks? You could learn the conversion formulas, or you could use this handy program written by Richard Hung, 13, of Massena, NY. It will convert Fahrenheit to centigrade or vice-versa. It can also display a series of temperatures in both systems, side by side.

The heart of the program lies in two conversion formulas in subroutines **450** and **500**. The formula on line **460** converts Fahrenheit to centigrade. Line **510**'s formula converts centigrade to Fahrenheit.

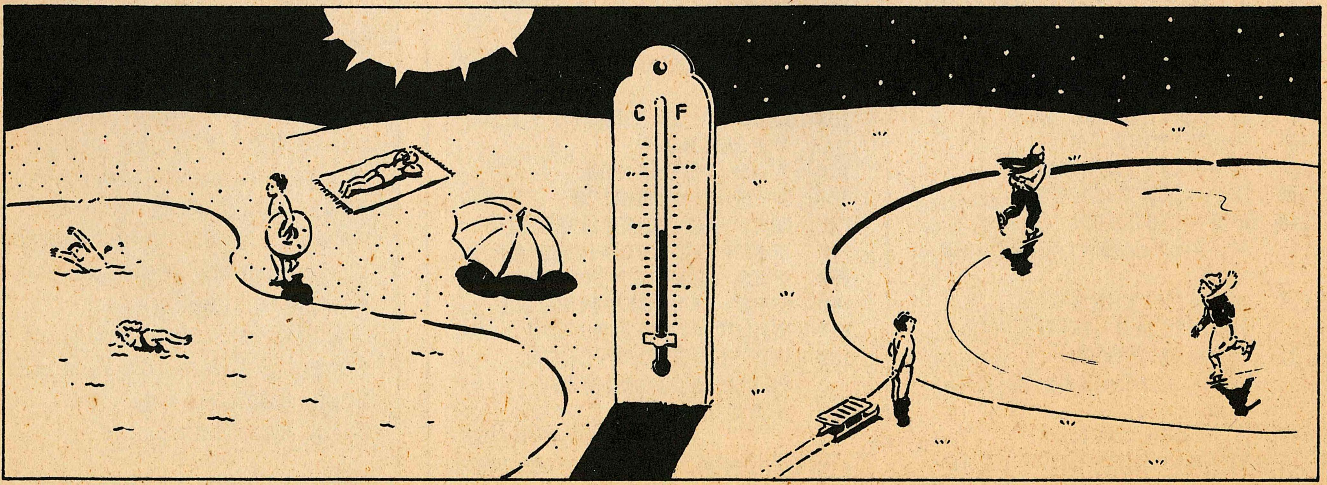
How does the program know which formula to use? The DEF FN commands in lines **460** and **510** defines function C(T) as the correct formula. Then the temperature is converted in line **250**. (What does DEF FN do? See this month's BASIC Glossary.)

Below is the program for Apple and Adam, followed by adaptations for other computers.

APPLE, ADAM:

```
10   REM TEMPERATURE
     CONVERSION PROGRAM
20   TEXT : HOME
30   PRINT "THIS IS A
     TEMPERATURE
     CONVERSION PROGRAM"
40   PRINT : PRINT "(1)
     CONVERTING FAHRENHEIT
     TO CENTIGRADE"
50   PRINT "(2) CONVERTING
     CENTIGRADE TO
     FAHRENHEIT"
60   PRINT "(3) QUIT"
70   PRINT : PRINT "INPUT THE
     NUMBER OF YOUR
     CHOICE";
80   INPUT A
90   IF A > 3 OR A < 1 THEN
     GOTO 20
100  ON A GOSUB 450,500,550
110  HOME
120  PRINT F$;" TO ";T$
130  PRINT : PRINT "WOULD YOU
     LIKE"
140  PRINT "(1) A CONVERSION
     TABLE"
150  PRINT "(2) INDIVIDUAL
     CONVERSIONS"
160  PRINT "(3) EXIT"
170  PRINT : PRINT "INPUT THE
     NUMBER OF YOUR CHOICE"
180  INPUT B
190  ON B GOTO 300,210,20
200  GOTO 120
210  HOME
220  PRINT "WHAT ";F$;"
     TEMPERATURE WOULD"
230  PRINT "YOU LIKE TO
     CONVERT TO ";T$
240  INPUT F
250  FC = FN C(F)
260  PRINT : PRINT : PRINT "THE
     ";T$;" TEMPERATURE IS"
270  PRINT FC;" DEGREES"
280  FOR P = 1 TO 2000
290  NEXT P: GOTO 110
300  PRINT : PRINT "INPUT
     STARTING TEMPERATURE";
310  INPUT E
```

(Program continues on next page)



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(Program continued from previous page)

```
320  PRINT “INPUT ENDING
     TEMPERATURE”;
330  INPUT G
340  IF E > G THEN GOTO 300
350  PRINT F$, T$: PRINT
360  SPEED = 150
370  FOR F = E TO G
380  LET I = FN C(F)
390  PRINT TAB( 5);F, I
400  NEXT F
410  SPEED = 255
420  PRINT : PRINT “HIT ANY
     KEY TO CONTINUE”
430  INPUT R$
440  GOTO 110
450  REM FAHRENHEIT TO
     CENTIGRADE
460  DEF FN C(F) = (F - 32) * 5 /
     9
470  F$ = “FAHRENHEIT”
480  T$ = “CENTIGRADE”
490  RETURN
500  REM CENTIGRADE TO
     FAHRENHEIT
510  DEF FN C(F) = F * (9 / 5) +
     32
520  F$ = “CENTIGRADE”
530  T$ = “FAHRENHEIT”
540  RETURN
550  HOME
560  PRINT “BYE!”: END
```

COMMODORE 64 AND VIC-20: Delete lines 360 and 410. Change lines 20, 110, 210 and 550 to: PRINT CHR$(147)

IBM AND TRS-80: Delete lines 360 and 410. Change lines 20, 110, 210 and 550 to: CLS

MICROSOFT BASIC: Delete lines 360 and 410. Change lines 20, 110, 210 and 550 to: PRINT CHR$(12) Change line 90 to read:

```
90 IF (A > 3) * (A <1) THEN 20
```

ATARI: Delete lines 360 and 410. Change lines 20, 110, 210 and 550 to: PRINT CHR$(125).

Add or change these lines. NOTE: In line 390 hold the ESC key and press the TAB key.

```
5    DIM F$(10), T$(10), R$(10)
250  IF V = 1 THEN 258
252  FC = F*(9/5) + 32
254  GOTO 260
258  FC = (F - 32)*5/9
280  FOR P = 1 TO 1200
380  IF V = 1 THEN 388
382  I = H*(9/5) +32
384  GOTO 390
388  I = (H - 32) * 5/9
390  PRINT "ESC - TAB";H,I
460  V = 1
510  V = 2
```

TI 99/4A: Delete lines 360 and 410. Change lines 20, 110, 210 and 550 to: CALL CLEAR.

Add or change these lines:

```
15   DEF FNC(T) = (T - 32) * 5/9
17   DEF FNA(T) = T * (9/5) +32
90   IF (A >3) + (A <1) < >0
     THEN 20
185  IF (B > 3) + (B<1) < >0
     THEN 120
250  IF V = 1 THEN 257
252  FC = FNA(F)
254  GOTO 260
257  FC = FNC(F)
280  FOR P = 1 TO 1200
340  IF E > 6 THEN 300
372  IF V = 1 THEN 380
374  LET I = FNA(H)
375  GOTO 390
380  I = FNC(H)
460  V = 1
510  V = 2
```

TIMEX-SINCLAIR: Delete lines 360 and 410. Change lines 20, 110, 210 and 550 to: CLS

Add or change these lines:

```
100  IF A = 1 THEN GOTO 450
105  IF A = 2 THEN GOTO 500
108  GOTO 550
190  IF B = 1 THEN GOTO 300
192  IF B = 2 THEN GOTO 210
195  IF B = 3 THEN GOTO 20
250  IF V = 1 THEN GOTO 258
252  LET FC = F*(9/5) +32
254  GOTO 260
258  LET FC = (F - 32) * 5/9
280  FOR I = 1 TO 500
380  IF V = 1 THEN 388
382  LET I = H *(9/5) +32
384  GOTO 390
388  LET I = (H - 32) * 5/9
390  PRINT TAB 5;H,I
460  LET V = 1
510  LET V = 2
```

—Richard Hung

(BASIC Training continues on next page)

BASIC GLOSSARY: DEF FN

DEF FN is a command found in many versions of BASIC. It stands for DEFine FuNction. DEF FN's name describes what it does. In BASIC, you can define a variable to equal a number. For example, you can have a line defining the variable X as equal to 10:

```
LET X = 10
```

DEF FN allows you to define a function variable as a mathematical formula. For example, you could define the function X as a formula this way:

```
DEF FN X(A) = A + (12*B)
```

Once you have defined a function, you can use it anywhere in a program and it will have the same effect as writing out the whole formula. So, in our example above, writing LET I = FN X(A) is the same as writing:

```
LET I = A + (12*B)
```

You can also change the variable that you want the formula to act upon. For example, LET I = FN X(C) in our example would be the same writing LET I = C + (12*B).

DEF FN is useful in cases like our "Mercury Monitor" program. Using DEF FN, the equation in line 250 can be defined as *either* formula.

Here's how it works. At line 100, the program will GOTO line 450, 500 or 550. If the program goes to line 450, the formula will be Fahrenheit to centigrade. If the program goes to line 500, the formula will be centigrade to Fahrenheit. If it goes to 550, the program ends.

(BASIC Training cont. from previous page)

CHALLENGE #11: SOUND OFF!

This month, when we say we want to hear from all you programmers out there, we really mean it. We want you to write a program that uses your computer's ability to make noise. (And we don't mean the sound of you yelling at it when your program crashes.)

You can write a program that helps you make music, or sound effects, or a noisemaker like the Commodore programs in this issue. Try to come up with something original. How about a program that matches sound to the mood of the user?

Send your program to CHALLENGE #11, ENTER Magazine, CTW, 1 Lincoln Plaza, N.Y., N.Y. 10023. We'll pick the best programs and print them in BASIC Training. The winners will receive $25 and an ENTER T-shirt.

All entries must be your original work. Programs can be for any home computer. Remember to enclose a note telling us your name, age, T-shirt size, the computer the program was written for, and a brief description of what the program does.

Entries must be postmarked no later than January 31, 1985. We read every program that is sent in, but we cannot reply to each and every one of you.

And remember, if you've written any other programs you think belong in ENTER, send them to BASIC Training at the address above. We pay between $25 and $50 for programs we publish.

WINNERS OF CHALLENGE #8: MATH ORBIT:

IBM PCjr AND PC WITH COLOR GRAPHICS CARD

A lot of the responses to this Challenge were programs that tested you in basic math. We liked this one by Jim Wagner of Arnold, Missouri, because of the original graphics that it creates.

The program draws a view of outer space, including the earth, the moon and your rocket ship. When you answer a question correctly, your ship gets closer to the moon. An incorrect response sends you backwards. And you better get the first question right, or you won't even blast off.

```
10    CLEAR:MX=16:MY=3
20    KEY OFF:SCREEN 1:
      SCREEN 0
30    RANDOMIZE (VAL(RIGHT$
      (TIME$,2)))
40    PRINT TAB(16);“MATH RACE”
50    PRINT:INPUT “WHAT KIND
      OF PROBLEMS (+,-,*,
      OR /)”;K$
60    IF K$<>“+” AND K$<>“-”
      AND K$<>“*” AND
      K$<>“/” THEN 50
70    PRINT : INPUT “WHAT
      LEVEL OF DIFFICULTY
      (1-3)”;D
80    IF D<1 OR D>3 THEN 70
90    CLS:SCREEN 1:COLOR 0,1
100   FOR STARS=1 TO 100
110   SX=INT(RND(1)*320)
120   SY=INT(RND(1)*200)
130   PSET(SX,SY),3:NEXT STARS
140   CIRCLE(10,130),25,1
150   PAINT(10,130),1,1
160   CIRCLE(285,25),50,2
170   PAINT(285,25),2,2
180   LOCATE 16,3:PRINT CHR$(6)
190   REM GET PROBLEM
200   IF D=1 THEN A=10:GOTO
      220
210   IF D=2 THEN A=100 ELSE
      A=1000
220   B=A
230   E=INT(RND(1)*A)+1
240   F=INT(RND(1)*B)+1
250   IF K$=“-” AND F>E THEN
      230
260   IF K$=“/” THEN E=E*F
270   LOCATE 18,20:PRINT
      E;K$;F;“=”
280   LOCATE 19,20:INPUT GUESS
290   IF K$=“+” THEN
      ANS=E+F
300   IF K$=“-” THEN
      ANS=E-F
310   IF K$=“*” THEN ANS=E*F
320   IF K$=“/” THEN ANS=E/F
330   IF GUESS=ANS THEN 510
340   REM WRONG
350   T=T+1
360   PRINT:PRINT
      TAB(20);“WRONG”
370   PRINT TAB(20);“THE
      CORRECT”
380   PRINT TAB(20);“ANSWER
      IS”; ANS
390   FOR W=1 TO 2500:NEXT W
400   LOCATE 18,20: PRINT
      SPC(15)
410   LOCATE 19,20:PRINT
      SPC(12)
420   LOCATE 21,20:PRINT SPC(5)
430   LOCATE 22,20:PRINT
      SPC(12)
440   LOCATE 23,20:PRINT
      SPC(16)
450   LOCATE MX,MY:PRINT “   ”
460   MX=MX+1:MY=MY-3
470   IF MX>16 THEN 630
480   LOCATE MX,MY:PRINT
      CHR$(6)
490   GOTO 200
500   REM CORRECT
510   T=T+1
520   PRINT TAB(20);“CORRECT!”
530   FOR W=1 TO 1000:NEXT W
540   LOCATE 18,20:PRINT
      SPC(15)
550   LOCATE 19,20:PRINT
      SPC(12)
560   PRINT TAB(20);SPC(8)
570   LOCATE MX,MY:PRINT“   ”
580   MX=MX-1:MY=MY+3
590   LOCATE MX,MY:PRINT
      CHR$(6)
600   IF MX<7 THEN 610 ELSE 200
```

(Program continues on next page)

(Program continued from previous page)

```
610  PRINT "YOU'VE MADE IT TO
     THE MOON IN ";T;" TRIES"
620  FOR S=262 TO 523 STEP
     10:SOUND S, 1:NEXT S:
     SOUND 523,20
630  PRINT:INPUT "WANT TO
     PLAY AGAIN";A$
640  IF A$="Y" OR A$="y"
     THEN 10
```

—*Jim Wagner*

BINARY CONVERTER: APPLE

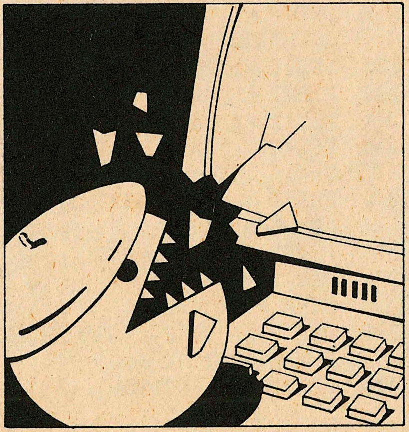
Challenge #8 asked you to create some "math magic." This winning program was entered by Paul Muller, 14, of Lakewood, Colorado. It can convert any decimal number from 1 to 255 to binary form. It also converts the other way, from binary to decimal. This program would be especially helpful to anyone who is doing some serious programming.

```
10   HOME : VTAB 5
20   PRINT "BINARY-DECIMAL
     CONVERTER"
30   POKE 34,9
40   HOME
50   PRINT "1. BINARY TO
     DECIMAL"
60   PRINT "2. DECIMAL TO
     BINARY"
70   PRINT "3. END"
80   PRINT : INPUT "PICK ONE
     <1-3>";A
90   ON A GOTO 110,270,480
100  GOTO 60
110  HOME : PRINT
120  PRINT "TYPE IN A BINARY
     NUMBER"
130  PRINT "(UP TO EIGHT
     DIGITS) ————————"
140  FOR I = 23 TO 30
150  VTAB 12: HTAB I
160  GET A$
170  IF A$ = "0" OR A$ = "1"
     THEN 190
180  VTAB 12: HTAB I: GOTO 150
190  PRINT A$ :B$ = B$ + A$ :
     NEXT
200  D = 0: FOR I = 0 TO 7
210  IF MID$ (B$ ,8 - I,1) = "1"
     THEN D = D + 2 ^ I
220  NEXT
230  PRINT "THE DECIMAL
     NUMBER IS ";D
240  A$ = "":B$ = ""
250  PRINT : PRINT "PRESS ANY
     KEY TO CONTINUE"
260  GET Z$ : GOTO 40
270  HOME : PRINT :B$ = ""
280  PRINT "TYPE IN A DECIMAL
     NUMBER"
290  PRINT "(NO HIGHER THAN
     255) ———"
300  FOR I = 23 TO 25
310  VTAB 12: HTAB I
320  GET A$ :A = ASC (A$)
330  IF A > 47 AND A < 58 THEN
     350
340  VTAB 12: HTAB I: GOTO 310
350  PRINT A$ :B$ = B$ + A$ :
     NEXT
360  IF VAL (B$ ) > 255 THEN 270
370  B = VAL (B$ ):B$ = ""
380  A$ = ""
390  FOR I = 7 TO 0 STEP - 1
400  A$ = "0"
410  IF INT (B / (2 ^ I)) > = 1 THEN
     A$ = "1":B = B - 2 ^ I
420  B$ = B$ + A$
430  NEXT
440  PRINT "THE BINARY
     NUMBER IS ";B$
450  PRINT : PRINT "PRESS ANY
     KEY TO CONTINUE ";
460  GET Z$
470  B$ = "": GOTO 40
480  END
```

—*Paul Muller*

SKETCHMAN: TI 99/4A

We often receive programs that let you draw on your screen with a joystick. This program, by Jeff Edwards, 13, of Dunkirk Maryland had a nice twist. It lets you draw on your screen with a little round monster who eats a line while making a loud chomping noise. Sound crazy? Try it and see.



© MIN JAE HONG

```
10   CALL SCREEN (2)
20   CALL CHAR(33,
     "FFFFFFFFFFFFFFFF")
30   CALL COLOR(1,13,1)
40   CALL CHAR(40,
     "7EEFFFC2C1FFFF7E")
50   CALL COLOR(2,7,1)
60   CALL CHAR (41,
     "7EFFFFFFFFFFFF7E")
70   CALL CHAR(42,"")
80   CALL CLEAR
90   CALL HCHAR(1,1,33,768)
100  X=15
110  Y=13
120  CALL JOYST(1,DX,DY)
130  X=X-DX/4
140  Y=Y-DY/4
150  X=INT(32*((X-1)/32-
     INT((X-1)/32)))+1
160  Y=INT(24*((Y-1)/24-
     INT((Y-1)/24)))+1
170  CALL SOUND(200,-8,0)
180  CALL VCHAR(Y,X,40)
190  FOR K= 1 TO 20
200  NEXT K
210  CALL VCHAR(Y,X,41)
220  CALL VCHAR(Y,X,42)
230  GOTO 120
```

—*Jeff Edwards*

(BASIC Training continues on next page)

(BASIC Training cont. from previous page)

BY A PROGRAM, FOR A PROGRAM:

IBM PCjr AND PC WITH COLOR GRAPHICS CARD

The first program you see below is a short graphics program that creates a colorful design on IBM computers. It's nice, but you might get tired of it. You can change the design by changing the program in lines 60 and 100. Or you can use the second program to make the changes for you.

The second program will actually write and save different versions of the first program on your disk. First, it will ask you for the name of the program you will create. Then it will display a circle on your screen. You use function keys 1 through 4 to change the size and shape of the circle. When you're done, press function 5. This saves your new program on your disk.

PROGRAM I

```
10    ON ERROR GOTO 110
20    CO=0
30    KEY OFF
40    SCREEN 1:CLS
50    S=S+3.123456789#
60    CIRCLE ( 160 , 100 ),S,C,,, 1 / 2.7
70    READ C
80    COLOR CO:A=A+1
90    IF A=140 THEN END ELSE
      GOTO 50
100   DATA 1,2,3,1,2,3
110   RESTORE:RESUME
```

PROGRAM II

```
10    ON ERROR GOTO 430
20    SCREEN 2:CLS
30    INPUT " WHAT FILE DO YOU
      WISH OUTPUT TO GO TO";
      FILE$
40    IF FILE$="" THEN 30
50    SCREEN 1:CLS:FOR R=1 TO
      10:KEY R,"":NEXT R
60    KEY 1,"AL+":KEY 2,
      "AT+":KEY 3, "G":KEY 4,
      "S":KEY 5,"E"
70    REM DRAW CIRCLE
80    A=160:B=100:C=20:D=2:
      E=1:F=1
90    IF B<10 THEN B=10
100   IF A<10 THEN A=10
110   IF B>190 THEN A=190
120   IF A>630 THEN A=630
130   CIRCLE(A,B),C,D,,,E/F
140   G$=INKEY$:IF G$=""
      THEN 140
150   IF G$="G" THEN
      CLS:C=C+1:GOTO 90
160   IF G$="S" THEN
      CLS:C=C-1:GOTO 90
170   IF G$="A" THEN GOTO 240
180   IF G$="8" THEN
      CLS:B=B-1:GOTO 90
190   IF G$="6" THEN
      CLS:A=A+1:GOTO 90
200   IF G$="4" THEN
      CLS:A=A-1:GOTO 90
210   IF G$="2" THEN
      CLS:B=B+1:GOTO 90
220   IF G$="E" THEN 300
230   GOTO 140
240   TG$=INKEY$:IF TG$=""
      THEN 240
250   YU=YU+1
260   IF YU=1 THEN
      UO$=TG$:GOTO 240 ELSE
      UO$=UO$+TG$:YU=0
270   IF UO$="L+" THEN
      CLS:F=F+.1:GOTO 90
280   IF UO$="T+" THEN
      CLS:E=E+.1:GOTO 90
290   REM CREATE FILE
300   OPEN FILE$ FOR OUTPUT
      AS #1
310   PRINT #1, "10 ON ERROR
      GOTO 110"
320   PRINT #1,"20 CO=0"
330   PRINT #1,"30 KEY OFF"
340   PRINT #1, "40 SCREEN 1:CLS"
350   PRINT #1,"50
      S=S+3.123456789#"
360   PRINT #1,"60 CIRCLE ("A",
      "B"),S,C,,,"E"/"F
370   PRINT #1,"70 READ C"
380   PRINT #1,"80 COLOR
      CO:A=A+1"
390   PRINT #1,"90 IF A=140 THEN
      END ELSE GOTO 50"
400   PRINT #1,"100 DATA
      1,2,3,1,2,3"
410   PRINT #1,"110
      RESTORE:RESUME"
420   CLOSE 1:END
430   REM ON ERROR
440   IF E<0 THEN E=0:
      RESUME 90
450   IF F<0 THEN F=0:
      RESUME 90
```

—Gregory Snyder

FORCE FIELD: ATARI

This graphics program for Atari computers gives your screen a sci-fi appearance. It also has great sound effects. "Force Field" was written by Craig Baldwin, age 14, of Madison, Wisconsin.

```
10    A=0:B=79:C=39:Q=40
20    S=131:I=1
30    GRAPHICS 5: SETCOLOR
      2,0,0
40    FOR L=1 TO Q
50    SOUND 3,S,10,15
60    S=S+3:COLOR Z
70    GOSUB 1000
80    A=A+1: B=B-1:C=C-1
90    Z=Z+1:IF Z=3 THEN Z=1
100   NEXT L
110   A=A-1:B=B+1:C=C+1
120   FOR L=1 TO Q
130   SOUND 3,S,10,15
140   S=S+1:COLOR Z
150   GOSUB 1000
160   A=A-1:B=B+1:C=C+1
170   Z=Z+1:IF Z=3 THEN Z=1
180   NEXT L
190   A=A+1:B=B-1:C=C-1
200   Q=Q-I:IF Q<1 THEN
      I=-1
210   IF Q>39 THEN I=1
220   GOTO 40
1000  PLOT A,A
1010  DRAWTO B,A
1020  DRAWTO B,C
1030  DRAWTO A,C
1040  DRAWTO A,A
1050  RETURN
```

—Craig Baldwin

CORRECTION:

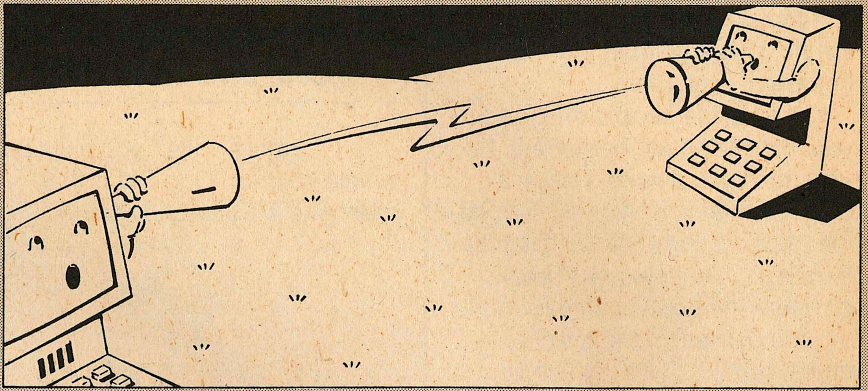
In our October issue, the adaptation of "Spiral Mania" for Atari should have included this line:

```
300   NEXT X
```

BASIC PLUS

Assembly Language, Part II

BY MARK SUTTON-SMITH


© MIN JAE HONG

Last month's BASIC Plus introduced you to the world of assembly-language programming. Naturally, after reading about the speed, graphics and other wonders of assembly as reported by yours truly, you decided to dive head-first into this new programming language. Now, all you want to know is, "How can I, too, learn to speak the true language of computers?"

Well, you've come to the right place. But first, a word of warning to the beginner: assembly is much harder to learn than BASIC. So be ready for some hard but rewarding work. (It would also be a good idea to have a friend, relative or teacher around who can answer your questions.)

The first thing you'll need to know is which kind of assembly language your computer uses. This depends on the type of microprocessor your computer is built around. The Apple, Atari and Commodore 64 all contain a 6502 microprocessor. When you write an assembly language program for one of these machines, it has to be in 6502 language. The Radio Shack TRS-80 Color Computer has the 6809 chip, the TI 99 4/A uses a TMS 9900, and IBM uses the 8088.

Next, you're going to have to buy a piece of software called an editor-assembler. What does this do? First, it allows you to type in and change an assembly-language program (that's the edit part). Then it will turn what you type into machine-usable code (yep, that's the assembler). If you've programmed in BASIC, you've already used a very similar program, the BASIC interpreter.

When you type the word RUN on your computer, you are really starting your BASIC interpreter. The interpreter translates the first line of your BASIC program into machine binary code. It executes that line. If it works, the interpreter repeats the process with the next line. An assembler does something similar. But it translates the entire program first, and stores the machine code in memory until you want to run it.

There are many good editor-assemblers on the market. Here are a few I can recommend:

APPLE: The Merlin Assembler, by Southwestern Software, $109
ATARI: Atari Editor/Assembler, by Atari, $56
COMMODORE 64: The Commodore Assembler, by Commodore, $49.95
IBM: MASM by Microsoft, $100
TRS-80 Color Computer: Editor/Assembler by Motorola, $49.95

You'll probably also want an instruction book to help you get started. A few of the good ones are:

Programming the 6502 by Rodney Zaks, Sybex Publishers, $13.95

IBM PC Assembly Language by Leo Scanlon, Brady Publishers, $19.95

Color Computer Assembly Language Programming, published by Radio Shack, $6.95

When you get set up, start by writing short programs that let you explore the things assembly can do that BASIC can't. Write programs that create sound or graphics so you can see the results right away. Even if you never design your own *Zaxxon* or *Space Invaders*, you'll learn a lot about what is really happening inside your computer.

MARK SUTTON-SMITH is an ENTER contributing editor.

FEEDBACK

ROOM FOR IMPROVEMENT

Although your magazine is terrific, I have an idea that would improve it even more.

Not all of the people that read your magazine are beginners. So why don't you devote a page a month explaining more advanced methods on computers? The first month you could explain how to program the joystick to respond to arcade games for the Commodore 64 and VIC-20. Or maybe explain how to make data files.

—Erin Smothers
Sacramento, CA

Dear Erin:

Could it be that you own a Commodore 64 or VIC-20?

Kidding aside, your point about the concerns of programmers is well taken. ENTER is taking strides in that very direction. We recently started our BASIC Plus page. Now, in addition to printing programs every month in BASIC Training, BASIC Plus will contain advice and information to help you write your own programs.

For instance, the first two installments of BASIC Plus gave tips on how to debug a program. Future BASIC Plus topics will include the best ways to structure programs, how to write programs, and ways to create and use data files.

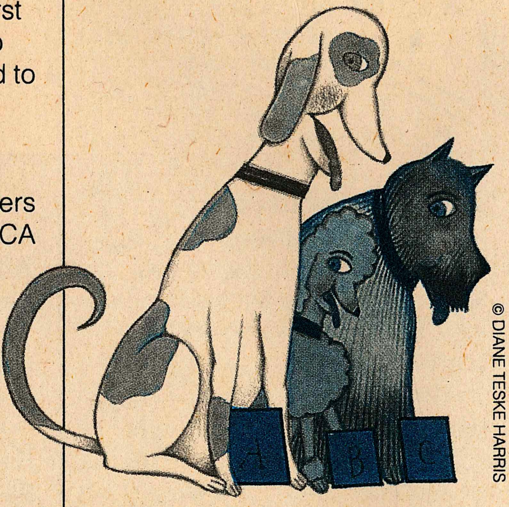
We try to answer very specific questions, like how to read the joystick on a Commodore 64, in our ASK ENTER department. But remember, sometimes the best place to look for the answer is right in your owner's manual.

—Ed.

MORE DOGGONE DATA

In October's "Bits," you have an article entitled "Dog Data" that mentions the *Select-a-Pooch* software used by an animal shelter in New York. I thought you might like to know that the same service is offered by Kal-Kan Dog Food. Theirs is called *Select-a-Dog.*

—Rebecca R. Terrill
Hampton, VA



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ZORK 1, KAYPRO 2

In your July/August '84 issue on page 17, I saw the advertisement "How to blow up a rubber raft." In the ad, it said that *Zork I* is compatible with almost every popular home computer. I wanted to buy *Zork I*, but my computer is a Kaypro 2, which is not a home computer. Do you know if *Zork I* will work on my computer?

—Amy Marie Coen
Phoenix, AZ

Dear Amy:

Yes, Zork is available for your Kaypro 2 and many other home computers. —Ed.

IN SEARCH OF SOFTWARE

I never know where to buy the games that you review.

—Clark Hoover
South Bend, IN

Dear Clark:

Probably the best way to avoid running all over town to find software is to pick up the phone. Call stores in your area (department stores with toy or computer sections, computer stores, even some video stores) that you know or think might sell game software. If they don't sell the game you're looking for, they may be able to tell you the company that distributes the games.

The Business-to-Business Yellow Pages, which you should find at your local library, will also list video game distributors. Write them for a list of the stores that sell the product you want.—Ed.

WRITE TO US!

ENTER wants to hear from you! Our CompuServe ID is 72456, 1776. Or write to us at ENTER, 1 Lincoln Plaza, New York, NY 10023.

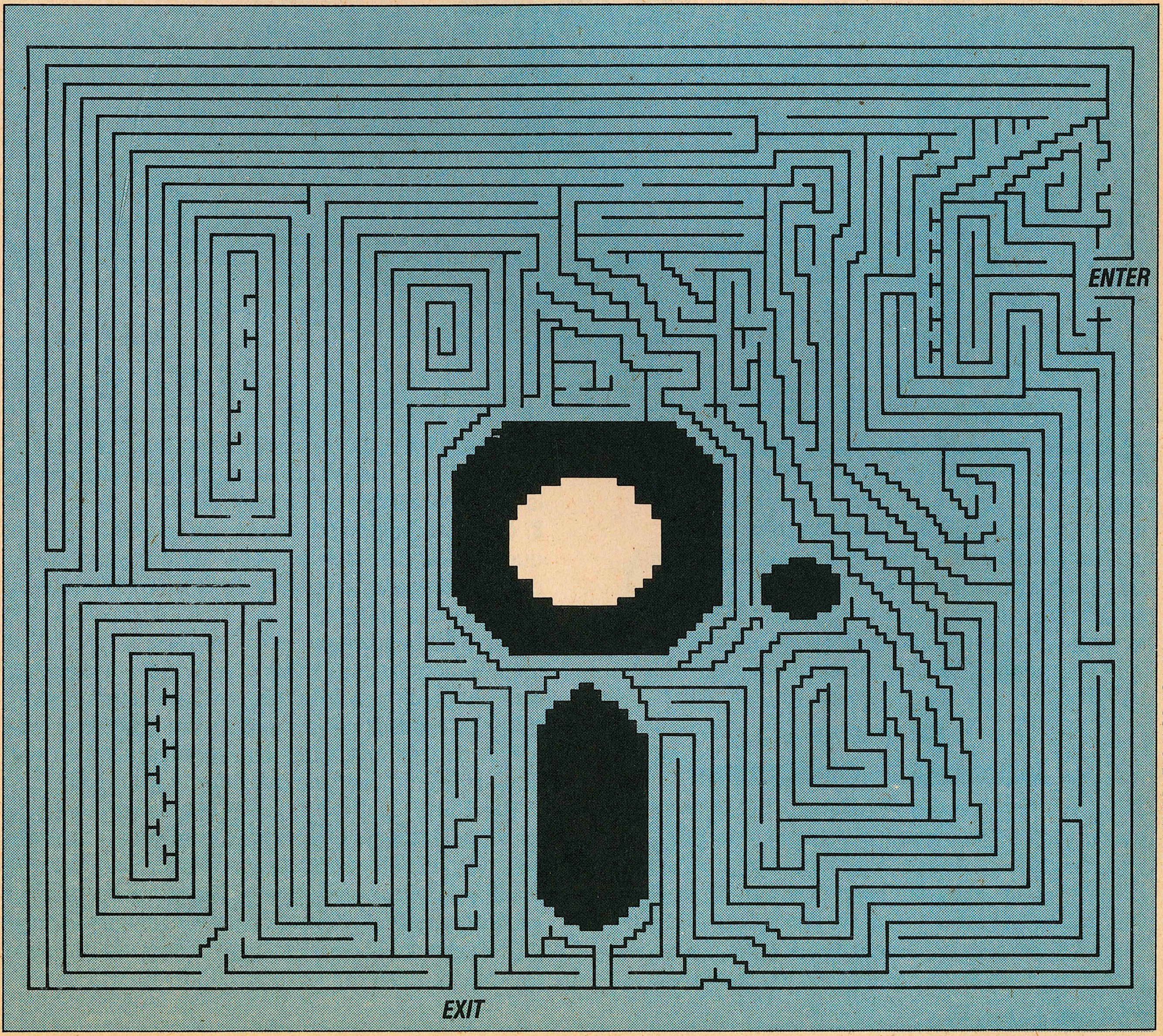
FLOPPY TRAILS

BY BELA SELENDY, 16

Does this computer-generated maze look familiar to you? Look a little closer. That's right—it's the a-maze-ing floppy disk! ENTER's youth advisor Bela Selendy created this maze on his school's Apple IIe. It took him over an hour to draw in all the lines by guiding the cursor on the computer.

The information on *this* disk can be accessed only by driving your pencil carefully from ENTER to EXIT. Watch out for dead ends and passageways that go the wrong way. After you've input all your information, GOTO page 40 and see if you've got the right answer.

Good luck!

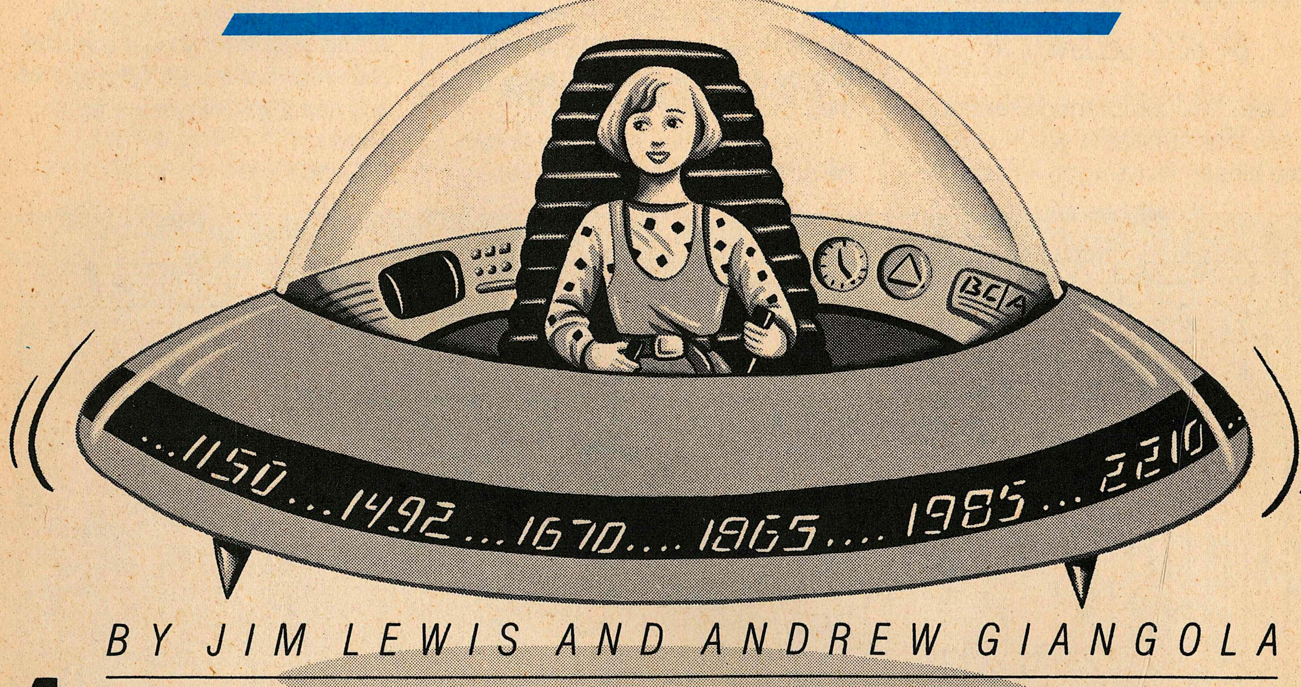


LINE DRAWING © NINA WALLACE FROM COMPUTER-GENERATED MAZE © BELA SELENDY

ENTER CONTEST #6

TRAPPED IN TIME!

WIN A COMMODORE 16!



© SUSAN FAIOLA

BY JIM LEWIS AND ANDREW GIANGOLA

A crew of 16 Commodore 16s is sailing on the sea. (They don't call 'em *C*-16s for nothing.) But the evil Lord Epoch has some nasty designs on these Cs. Epoch wants to put all computers in permanent downtime, using his devastating data-processing powers to take complete control of time. But you can stop Epoch—and win one of the 16 C-16s for your very own! All you've got to do is travel through time and solve Epoch's complex compilation of historical hints.

HOW TO PLAY

1. Follow Epoch's every step through history. *Fill in the blanks* that ask for the name of a specific event, person, book, or other historic happening.

2. After you've answered every question, find out what year an event happened (or the years the person you named lived). Place the 12 answers in the order they happened through history. With all the answers in chronological order, read off the first letter of each answer. That will spell out where the crew of computers is being held. *Write this answer down.*

3. Once you've got that answer, go back through the questions and search for clues that lead you to the crew of captured computers. *Write down as many clues as you can find.*

4. Send all these answers to: "Trapped in Time," ENTER Magazine, P.O. Box 777, Ridgefield, NJ 07657. Your answers must arrive no later than February 15, 1985. Remember to include your name, address, age and phone number, so we can contact you if you're a winner. All entrants must be under 18 years of age.

The ENTER staff will judge all entries and select the top 16 on the basis of accuracy, completeness, and creative presentation. The more clues you include, the better your chance of winning. The top 16 entrants will each win one of the Commodore 16s (and an angry grimace from evil Lord Epoch). Winners will be notified by April 10, 1985.

1 Suddenly, you're sailing through a time warp whirlpool. You jump from era to era, but at first there is no pattern. Finally, you come to things of shape. Your sidekick, Bromley Kent, lends you a hand. You're at a place that's small and large at the same time. And at the moment you land, a famous fracas is going on. In general, this is no time to be sitting around. You're at the battle of ______ ______ ______.

2 Be warned! And cling on to your hat. As a true time traveller, you know something's wrong aboard this machine. The captain is on the beam, but your star-filled vehicle has blown up. You say goodbye to the ship, ______, and move on.

3 Voyaging now in turbulent seas, you find yourself heading west with Anthony on the good ship Beagle. You pass a shipwreck and barely make it past Dr. M's volcanic island, then pass Tono-Bungay. You meet a man with something to say about the beginnings of a race. Don't let him make a monkey out of you. He'll publish his most original book this year; right now, all he wants to talk about is his theory of ______.

4 It's been said that Herbert George put the first men in the moon. But now you've landed around the time of Elvis and the Fabians. Flight into space begins. In October, a tiny first satellite sails into orbit. Its name, of course, is ______.

5 Look out! You zip over London and speed past France. The Duke of Wellington is defeating his rival at this place. It's home to a battle that will change the outline of history, but this place sounds like it's all wet. Is it because of the rain, Claude? That would be fitting in a place called ______.

6 Away we go! Set to sea, lady, but look up in the sky! We're in New Jersey, of all places, not far from Grovers Mills. A giant airship from across the sea has burst into flames. A great tragedy occurred when the ______ exploded.

7 Is that a bird, a lone eagle perhaps? No, it's a lucky man soaring across the ocean. He's flying through the heavens, but what does he have for lunch, the food of the gods? Flying from the U.S. to France is a feat in this year. Of course, in the present it's done time after time. Still, you're proud to be along for the ride with a hero whose last name is ______.

8 Evil Epoch surrender! The planets revolve around the sun, not you. It has been proven by this famous figure, who used a telescope to prove the point. Where is he? Dropping a light and a heavy object off the tower that leans. Discovery never stops when your name is ______.

9 In the whirlpool again and back to New Jersey. Everyone is wearing strange costumes for some reason. The radio tells you that Martians have landed. Is this a hoax or a real war of worlds? Anticipations abound. What's the full name of the citizen behind this confusion? ______ ______.

10 Making your way through history, you might get lost. You'll need a little marker so you won't miss the boat. In fact, you hear someone singing about a Good Ship Lollipop. On the silver screen, you see a curly-haired kid who was a star in these years. Though her smile is sunny, her name isn't Rebecca; it's ______ ______.

11 Now what's this? You're almost down for the count. But, like Mr. Britling, you'll see it through. Here's a giant computing device with vacuum tubes—the first machine of its kind to be bought and used by business. To keep track of the population, the census bureau counted on ______.

12 No escape, Epoch. Your mind is at the end of its tether. We'll get help here from this old-time medicine man, who has made an oath that others will follow. With help from this "father-figure" named ______, we'll cure your madness and make you reveal where the C-16s are.

NEXT

COMING IN OUR MARCH ISSUE:

COMPUTERS IN SPACE: Ride with astronaut Anna Fisher aboard the shuttle *Discovery*—and find out how computers help run the shuttle. Then learn how Mission Control computer experts deal with out-of-this world computer problems, like the dreaded DiPs Malf.

COMPUTER CAMP '85: Is computer camp right for you? What are the alternatives? How do you choose between all the different types? The answers to these questions in our annual guide to Keyboard Camping.

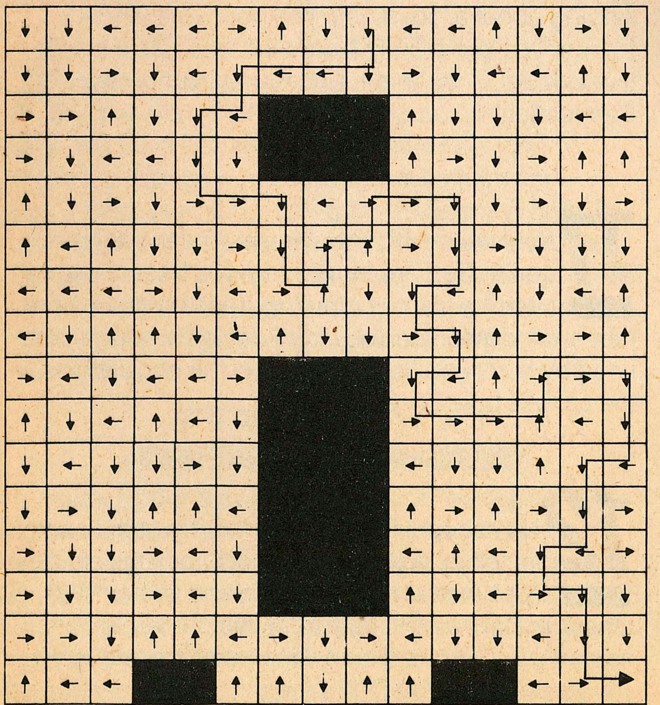
ROUND-UP TIME: ENTER sheds light on light pens with a review of these new graphic controllers...And, a preview of top computer printers.

CURSOR, FOILED AGAIN: Evil Cursor has trapped you inside a computer. Can you escape? Or will you be caught in a programming loop? An interactive game you play right in the magazine—from the creator of "The Ice Pirates."

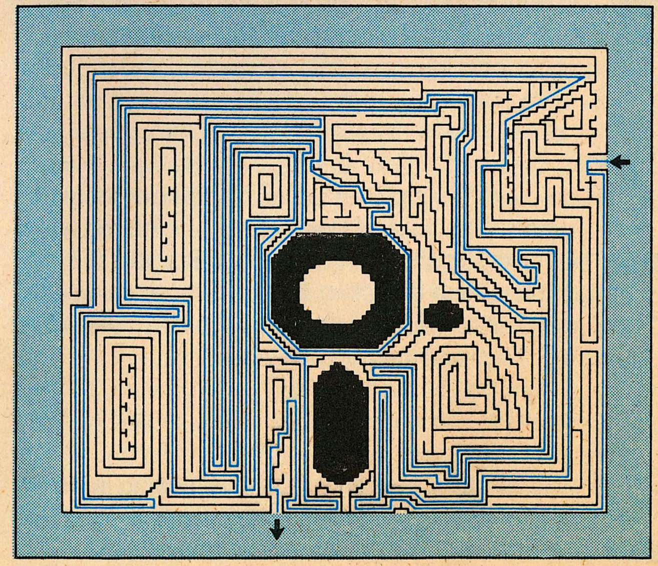
PLUS: Return of *Gonzo Games*, your silly serving of outlandish game ideas...The story of 'Pinball Construction Set' software designer Bill Budge...And, of course, computer projects in ENTER Center, our hands-on programming and high-tech help section.

ANSWERS

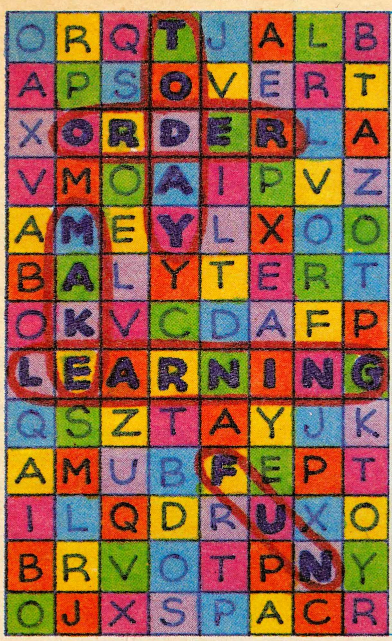
PERPLEXING PIXELS *(Page 57)*



FLOPPY TRAILS *(Page 37)*



DETACH HERE AND MAIL TODAY.



O	R	Q	T	J	A	L	B
A	P	S	O	V	E	R	T
X	O	R	D	E	R	L	A
V	M	O	A	I	P	V	Z
A	M	E	Y	L	X	O	O
B	A	L	Y	T	E	R	T
O	K	V	C	D	A	F	P
L	E	A	R	N	I	N	G
Q	S	Z	T	A	Y	J	K
A	M	U	B	F	E	P	T
I	L	Q	D	R	U	X	O
B	R	V	O	T	P	N	Y
O	J	X	S	P	A	C	R

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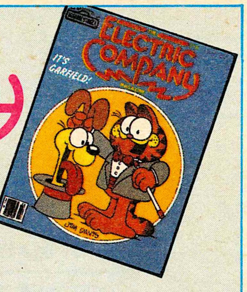

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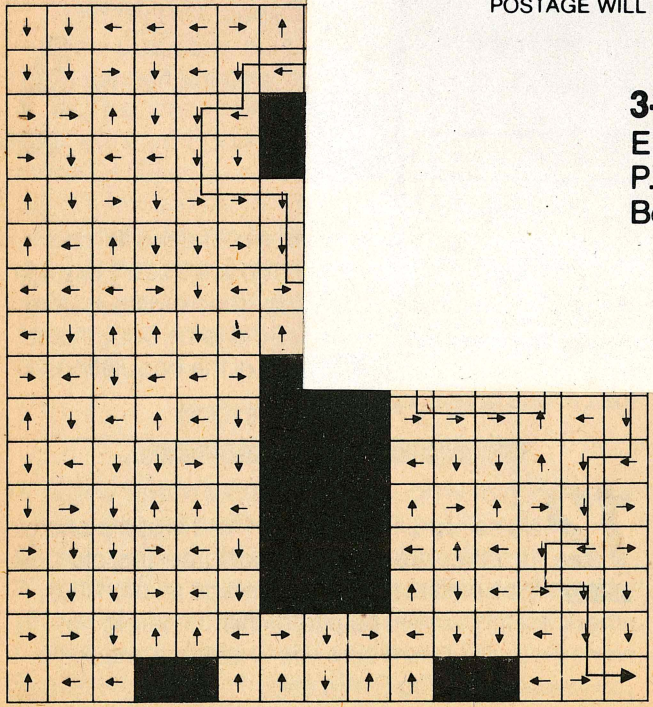

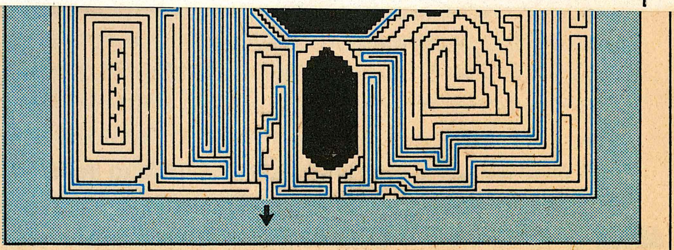

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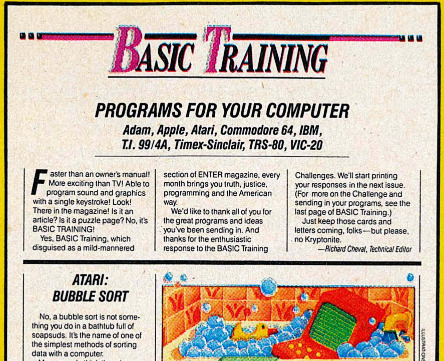

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PROGRAMS FOR YOUR COMPUTER

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Faster than an owner's manual! More exciting than TV! Able to program sound and graphics with a single keystroke! Look! There in the magazine! Is it an article? Is it a puzzle page? No, it's BASIC TRAINING!

Yes, BASIC Training, which disguised as a mild-mannered section of ENTER magazine, every month brings you truth, justice, programming and the American way.

We'd like to thank all of you for the great programs and ideas you've been sending in. And thanks for the enthusiastic response to the BASIC Training Challenges. We'll start printing your responses in the next issue. (For more on the Challenge and sending in your programs, see the last page of BASIC Training.)

Just keep those cards and letters coming, folks—but please, no Kryptonite.

—Richard Cheval, Technical Editor

ATARI: BUBBLE SORT

No, a bubble sort is not something you do in a bathtub full of soapsuds. It's the name of one of the simplest methods of sorting data with a computer.

Many people think there is some magic "SORT" button on computers that allows you to alphabetize items or put lists in numeric order. But like everything else a computer does, sorting has to be programmed.

The bubble sort got its name because if you displ

is bein

ILLUSTRATIONS ©

the fun and challenging world of computers

Now from the people who brought you **SESAME STREET, THE ELECTRIC COMPANY,** and **3-2-1 CONTACT** comes **ENTER,** the magazine that is as exciting as computers themselves. There is news about computers, video games and everything from lasers to robots—plus puzzles, board games, quizzes and other features that make learning about computers easy and fun. You won't want to miss an issue. So order your subscription now.

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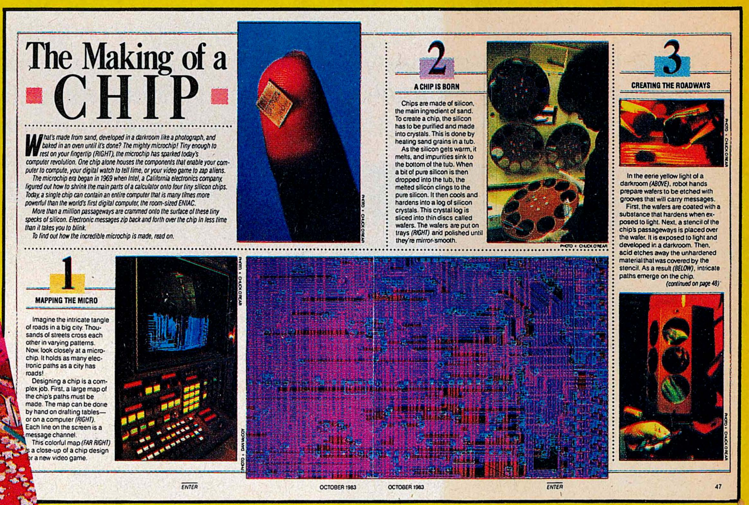

The Making of a CHIP

What's made from sand, developed in a darkroom like a photograph, and baked in an oven until it's done? The mighty microchip! Tiny enough to rest on your fingertip (RIGHT), the microchip has sparked today's computer revolution. One chip alone houses the components that enable your computer to compute, your digital watch to tell time, or your video game to zap aliens.

The microchip era began in 1969 when Intel, a California electronics company, figured out how to shrink the main parts of a calculator onto four tiny silicon chips. Today, a single chip can contain an entire computer that is many times more powerful than the world's first digital computer, the room-sized ENIAC.

More than a million passageways are crammed onto the surface of these tiny specks of silicon. Electronic messages zip back and forth over the chip in less time than it takes you to blink.

To find out how the incredible microchip is made, read on.

PHOTO © CHUCK O'REAR

1

MAPPING THE MICRO

Imagine the intricate tangle of roads in a big city. Thousands of streets cross each other in varying patterns. Now, look closely at a microchip. It holds as many electronic paths as a city has roads!

Designing a chip is a complex job. First, a large map of the chip's paths must be made. The map can be done by hand on drafting tables—or on a computer *(RIGHT)*. Each line on the screen is a message channel.

This colorful map *(FAR RIGHT)* is a close-up of a chip design for a new video game.

PHOTO © CHUCK O'REAR

PHOTO © DAN McCOY

2

A CHIP IS BORN

Chips are made of silicon, the main ingredient of sand. To create a chip, the silicon has to be purified and made into crystals. This is done by heating sand grains in a tub.

As the silicon gets warm, it melts, and impurities sink to the bottom of the tub. When a bit of pure silicon is then dropped into the tub, the melted silicon clings to the pure silicon. It then cools and hardens into a log of silicon crystals. This crystal log is sliced into thin discs called wafers. The wafers are put on trays *(RIGHT)* and polished until they're mirror-smooth.

PHOTO © CHUCK O'REAR

3

CREATING THE ROADWAYS

PHOTO © CHUCK O'REAR

In the eerie yellow light of a darkroom *(ABOVE)*, robot hands prepare wafers to be etched with grooves that will carry messages.

First, the wafers are coated with a substance that hardens when exposed to light. Next, a stencil of the chip's passageways is placed over the wafer. It is exposed to light and developed in a darkroom. Then, acid etches away the unhardened material that was covered by the stencil. As a result *(BELOW)*, intricate paths emerge on the chip.

(continued on page 48)

PHOTO © CHUCK O'REAR

ENTER OCTOBER 1983 OCTOBER 1983 ENTER 47

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NEW COMPUTER GAMES

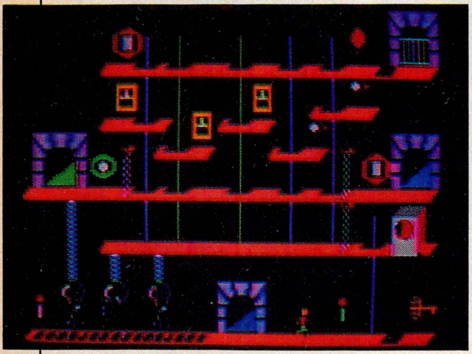
BY PHIL WISWELL AND
BERNIE DEKOVEN

◆◆◆

THE CASTLES OF DOCTOR CREEP

(Brøderbund, Commodore 64, $29.95)

Doctor Creep is a busy, nasty fellow. He's got 13 castles, each with a different arrangement of puzzling rooms to guard.



There are more than 200 rooms, and they're all like mazes, consisting of ladders, sliding poles, and walkways that lead to doors and on to other rooms.

Of course, each room has its pitfalls, too. Some are guarded by the minions of Doctor Creep; others by secret traps and difficult-to-negotiate pathways.

Your character is *not* in search of treasures, a kidnapped princess or magical powers.

In fact, he is in search of just one thing: the door leading out of the castle. But to reach it, you need to open many other doors with color-coded keys. The castles are constructed to give you the maximum runaround. This game takes some clever thinking.

There's one aspect of *Dr. Creep* that really makes us stand up and cheer. The castles can be explored by two players at the same time, making it a cooperative game that is even more fun than the one-player version.

WRAP-UP

PHIL: My only complaint about this game is the noticeable lack of sound effects, evidently traded off for the wonderful graphics and number of rooms to explore.

BERNIE: I was impressed by the tutorial game and the great variety of options you get on the main menu. The two-player game is the best.

◆◆◆

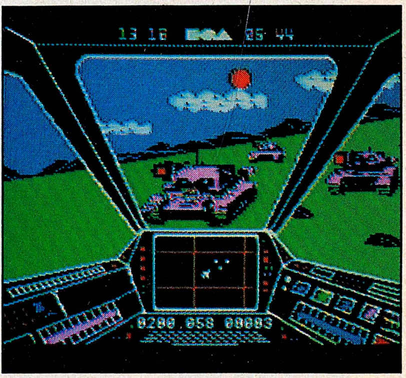
SKYFOX

(Electronic Arts, Apple II, $40)

This flight/battle simulator is by far the best in its category. It advances state-of-the-art graphics on the Apple to a level you have to see to believe. Your view is from the cockpit of the jet fighter *Skyfox*. The scrolling action of the ground and air scenery and of the enemy tanks, assault jets, and motherships is good enough to make the hair on Clint Eastwood's neck stand up.

Your joystick controls diving, climbing, banking to either side, and firing of the gun and heat-seeking missiles. Other features of the jetcraft are available by tapping on the keyboard. For example, a nifty computer screen opens like a "window" over your view when you press "C." This computer will locate enemies on a grid and identify their distance from both you and your base, which must be protected at all costs. Pressing "A" puts the jet on autopilot.

There are half a dozen instruments to monitor while you dogfight jets and tanks, but it isn't complicated to fly. For one thing, you *can't* crash into the mountains or the desert floor—no matter how hard you try. The game just allows you to concentrate on the battles at hand.



WRAP-UP

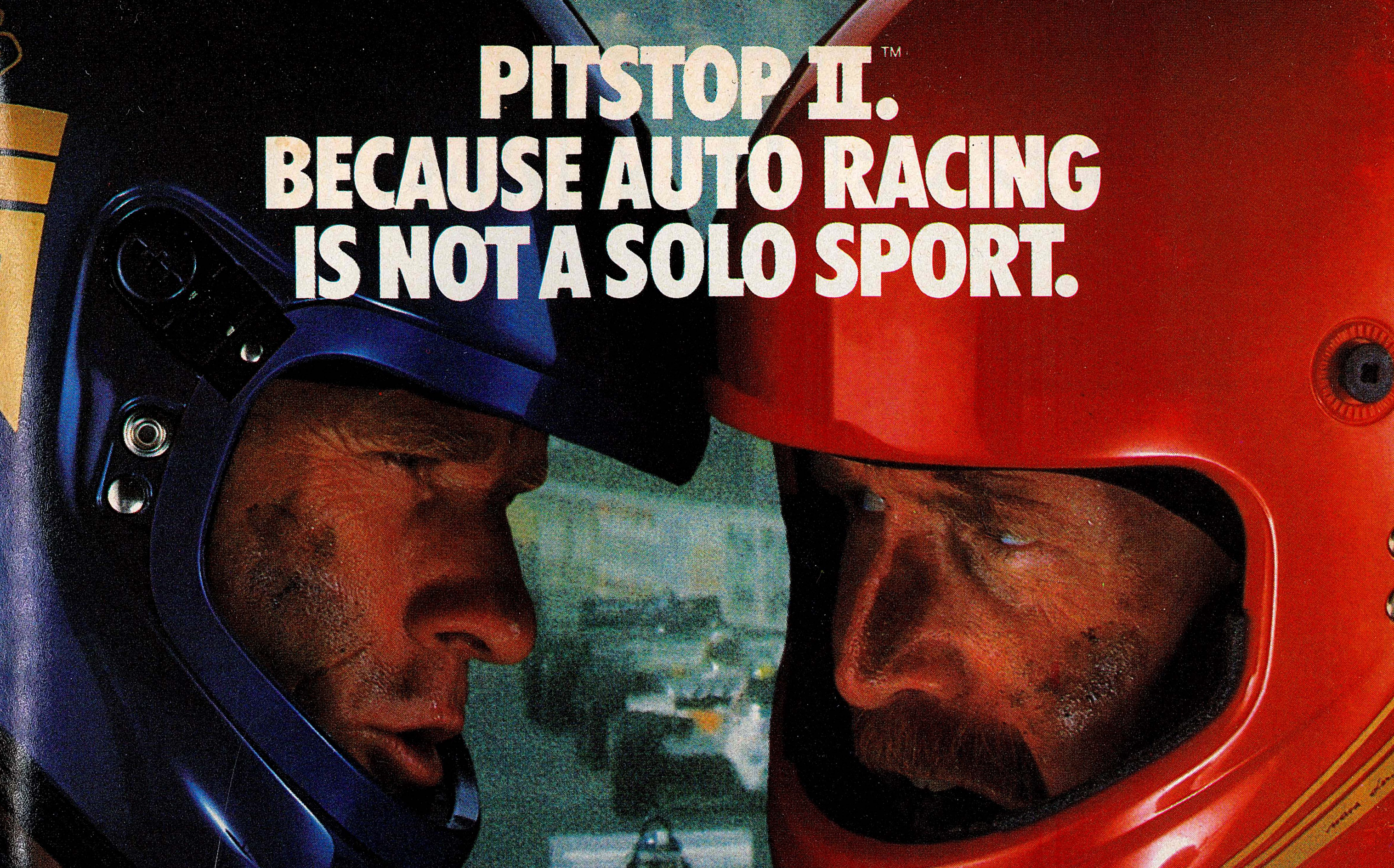
BERNIE: Fifteen scenarios and five skill levels add lots of variety to *Skyfox,* and open it to a wide range of players.

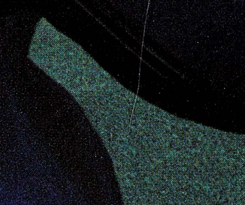
The graphics will literally make your mouth drop open.

PHIL: Beautiful, yes. Still, it's just a shoot-em-up, a concept that is both violent and plotless. I guess I'm just tired of shooting games.

(Continued on page 44)

PITSTOP II.™ BECAUSE AUTO RACING IS NOT A SOLO SPORT.





When we introduced Pitstop, we created action in the pits. Now, with PITSTOP II, EPYX introduces true competitive auto racing, both on the track and in the pits. Auto racing is not a one man sport. With PITSTOP II, you can now experience the thrill of speed and competition as you battle your opponent in a race against the clock. Now, more than ever, the strategy of when you make a pit stop and your pit crew's speed and performance, combined with your skill on the track, will determine the winner.

A split screen shows you your position and that of your opponent, a digital clock displays time and a lap counter gives you your race position as you race against each other in pursuit of the checkered flag. You can also play against the computer or take a few practice laps as you prepare for the real head-to-head competition. Step up to PITSTOP II because auto racing is not a solo sport.

One or two players: joystick controlled; disk or cassette.

EPYX
Strategy Games for the Action-Game Player
PITSTOP II

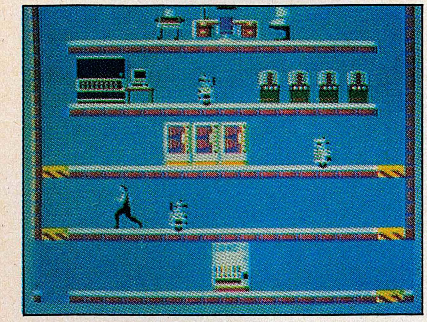
EPYX™
COMPUTER SOFTWARE

Strategy Games for the Action-Game Player

(Continued from page 42)

IMPOSSIBLE MISSION

(Epyx, Commodore 64, $39.95; Apple version planned)



Here you control a beautifully detailed and animated secret agent in a maze of 32 rooms connected by elevator shafts and tunnels. As in *Doctor Creep,* each room presents a unique set of problems. However, *these* rooms are solved by good joystick play more often than by logic.

A "typical" room contains platforms suspended in the air, lifts that carry your agent up and down, pieces of furniture, robot guards, two exits, and several computer terminals. Each piece of furniture is hiding one of three things: a code word allowing you to freeze the guards, a piece of the master puzzle, or nothing.

The object of the game is to gather enough clues to solve the master puzzle. You have tools for flipping the pieces, recoloring them to match others, and even a telephone line to a central computer that can give you the correct orientation for any piece.

WRAP-UP

BERNIE: The combination of addictive arcade-like action and puzzle-solving strategy makes *Impossible Mission* the best game of its type I've seen this year.

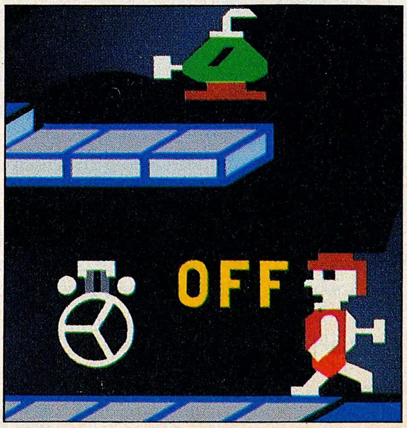
PHIL: I can't agree more. Everything from sound effects to game logic to graphics is very well done. And you'll be thrilled to watch your agent not only run and jump, but actually somersault in mid-air at the touch of the action button. Don't miss this game.

TOY BIZARRE

(Activision, Commodore 64, disk and cartridge, Atari home computers and 5200 game systems, ColecoVision; $31.95 disk, $34.95 cartridge)

This action game has you capturing toys in a toy factory. The screen is an obstacle course of walkways that wrap around the screen left and right. You capture toy helicopters by jumping over them twice, and balloons by touching them. Your character can easily jump to the screen's various levels with a press of the action button and a bit of steering. In order to pass from screen to screen, you have to turn off special valves by passing through them in order.

Unfortunately, you also have to contend with Hefty Hilda, a wind-up doll who chases you around the factory. Avoid Hilda at all costs. And try to send her into orbit by jumping on one end of a platform when she is at the other end. It's lots of fun!



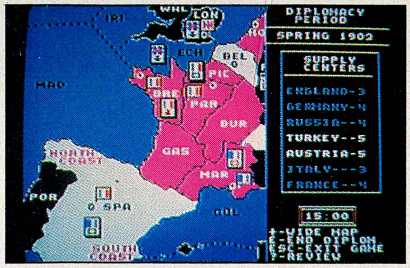
WRAP-UP

PHIL: You might call *Toy Bizarre* a maze game, because you need to learn a different pattern for each of its many screens.

BERNIE: But it doesn't *feel* like a regular old maze game. It's a fresh approach to a familiar idea. The graphics, sound and bonus rounds were very nicely done. This game is more than cute; it's also worthy of attention.

COMPUTER DIPLOMACY

(Avalon Hill Microcomputer Games, IBM PC, $50)



This *Diplomacy* is a computer version of the classic board game. Up to seven players take control of the major European powers of 1901. Through military strategy and diplomatic alliances, treaties, deals, double-crosses, and betrayals, each player tries to gain control of a majority of supply centers.

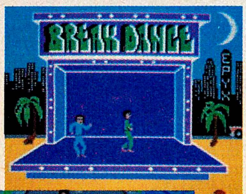
Computerized *Diplomacy* is a challenging game, but it's only available to a limited audience. If you haven't got an IBM PC with 256K RAM, you can't play. That's a shame.

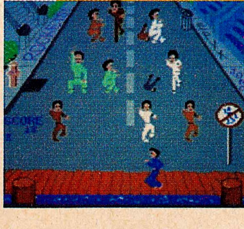
WRAP-UP

PHIL: This game is best played

(Continued on page 46)

BREAKDANCE.™
BREAKIN' MADE EASY.





The hottest craze in the U.S. this fall is Breakdancing, and you don't have to miss it. Now anyone can Breakdance. Just grab your joystick and control your Breakdancer in poppin, moon walking, stretching and breaking... all on your computer screen.

Breakdance, the game, includes an action game in which your dancer tries to break through a gang of Breakers descending on him, a "simon-like" game where the dancer has to duplicate the steps of the computer-controlled dancer and the free-dance segment where you develop your own dance routines and the computer plays them back for you to see. There's even a game that challenges you to figure out the right sequence of steps to perform a backspin, suicide or other moves without getting "wacked."

Learn to Breakdance today! Epyx makes it easy!

One or two players; joystick controlled.

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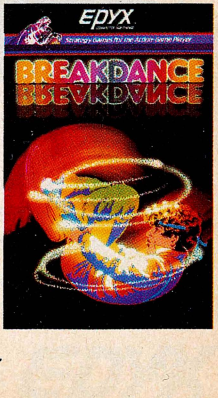
Strategy Games for the Action-Game Player



(Continued from page 44)

with all seven players, and it takes at least four or five hours to play.

BERNIE: This is one of Avalon Hill's best technical efforts. Everything works fine except the map. It scrolls well enough, but you can't get a decent overview of Europe.

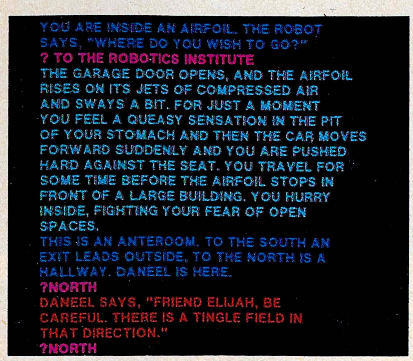
◆◆◆

ROBOTS OF DAWN

(Epyx, Commodore 64 and Apple II, $39.95)

This is an all-text adventure based on the best-selling science fiction novel of the same name by Isaac Asimov. A murder mystery involving humans and robots, it takes place on the planet Aurora. You are the Earth's most famous detective, Elijah Baley. You've been called in on the case, even though Aurorans *despise* Earthlings. You will have to be very clever just to remain on the planet for long.

We don't want to give away much of the plot. Suffice it to say that one of your first acts on Aurora is to find your robotic pal, Daneel. This robot helps you locate the other things you need, and even interpret their uses.



```
YOU ARE INSIDE AN AIRFOIL. THE ROBOT
SAYS, "WHERE DO YOU WISH TO GO?"
? TO THE ROBOTICS INSTITUTE
THE GARAGE DOOR OPENS, AND THE AIRFOIL
RISES ON ITS JETS OF COMPRESSED AIR
AND SWAYS A BIT. FOR JUST A MOMENT
YOU FEEL A QUEASY SENSATION IN THE PIT
OF YOUR STOMACH AND THEN THE CAR MOVES
FORWARD SUDDENLY AND YOU ARE PUSHED
HARD AGAINST THE SEAT. YOU TRAVEL FOR
SOME TIME BEFORE THE AIRFOIL STOPS IN
FRONT OF A LARGE BUILDING. YOU HURRY
INSIDE, FIGHTING YOUR FEAR OF OPEN
SPACES.
THIS IS AN ANTEROOM. TO THE SOUTH AN
EXIT LEADS OUTSIDE, TO THE NORTH IS A
HALLWAY. DANEEL IS HERE.
?NORTH
DANEEL SAYS, "FRIEND ELIJAH, BE
CAREFUL. THERE IS A TINGLE FIELD IN
THAT DIRECTION."
?NORTH
```

Although the sentence parser is not as sophisticated as in Infocom's games, the text is good.

WRAP-UP

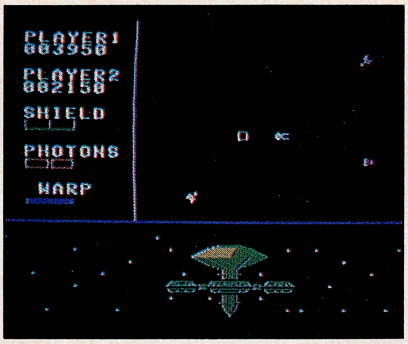
BERNIE: Daneel is a lot of help. He has a tape recorder and can play back any of the conversations you held with suspects. I had a lot of fun playing *Robots of Dawn*.

PHIL: Playing with robots is just good, imaginative fun. And it's easier to solve than most Infocom games.

◆◆◆

STAR TREK

(Coleco, Colecovision and Adam, $30)



The screen display for this shoot-em-up in space is divided into three areas. The top two-thirds of the screen show your score and the status of shields, photons, and warp energy. You also get a radar "top view" that shows the positions of Klingon ships, starbases, and the *Enterprise* (that's you). The bottom third of the screen shows Klingon ships racing in and out of view.

Unfortunately, this space is too small to adequately display the action. You end up watching the radar display, which is something like a crude game of "Tank." You shoot. You move. They move. They shoot back.

WRAP-UP

PHIL: Yeccccchhhhhh! That's all I can say about *Star Trek*.

BERNIE: Well, it's a *little* bit better than that.

◆◆◆

CHAMPIONSHIP LODE RUNNER

(Brøderbund; Apple II, Commodore 64, $34.95)

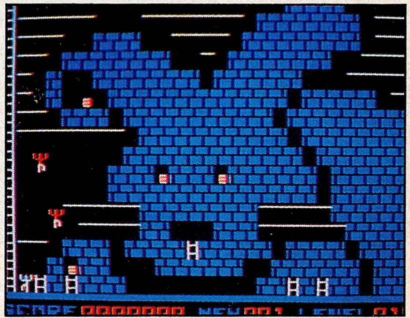
If you were challenged by *Lode Runner,* then get ready to be doubly dared by this tougher version. It's easy to figure out how it works from the picture. You run around the maze and dig holes in the brick floors. The object? To trap guards long enough to collect all the gold chests and advance to the next screen.

Actually, it isn't *that* simple. *Lode Runner* had 150 screens ranging from easy to difficult. *Championship Lode Runner* has only 50 screens, but they range from *very* difficult to obnoxiously difficult. *These* joystick puzzles have no mercy. One false step and you've "bought the farm."

If you buy this game, don't say we didn't warn you—it's tough.

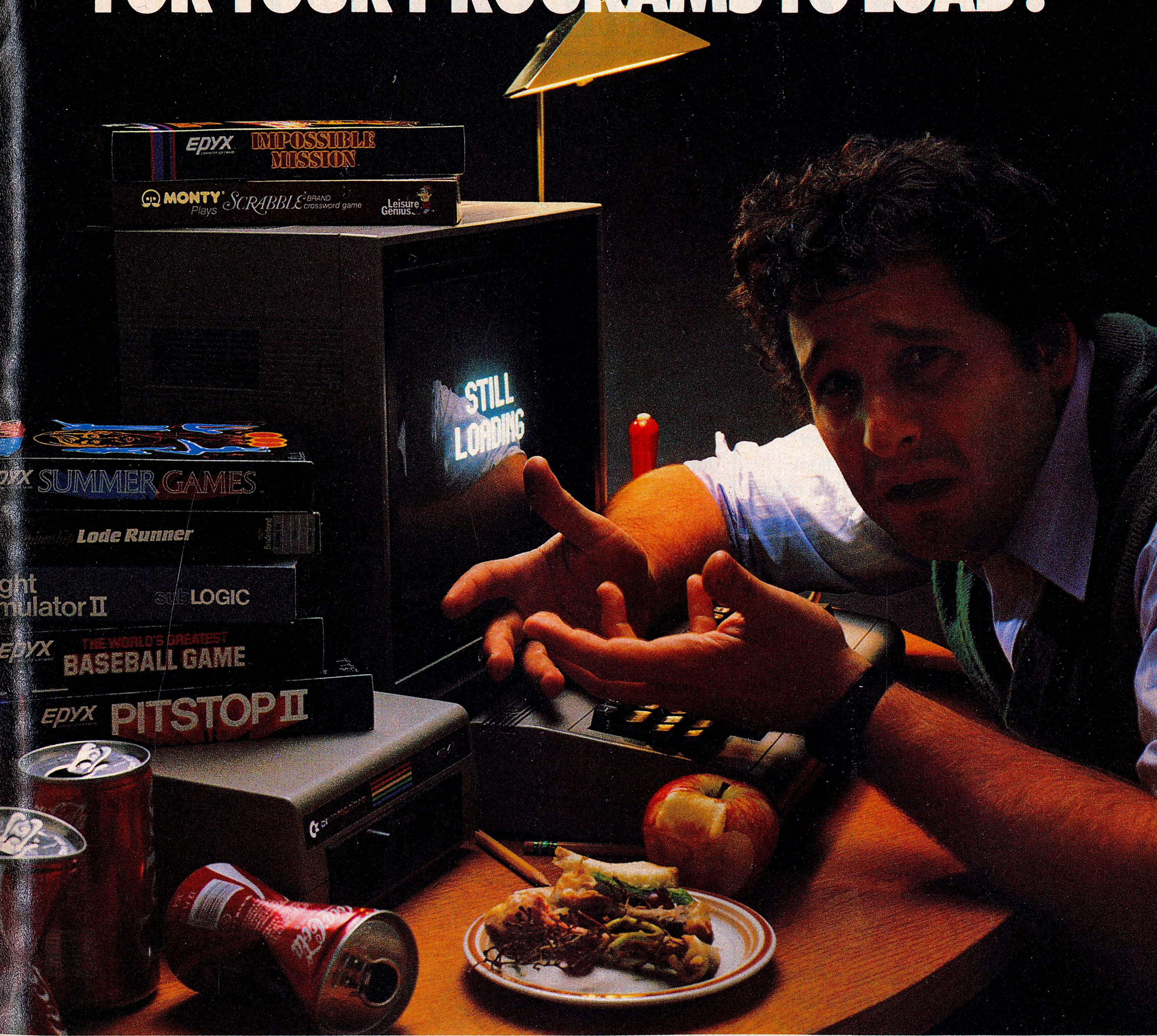
WRAP-UP

BERNIE: Talk about tough! Even the hint book that diagrams at least a partial solution to all 50 screens didn't help me very much. You really have to be willing to work at this game.



PHIL: I have spent an awful lot of time this past month playing *Championship Lode Runner*. I'm still working on screen 12!

TIRED OF WAITING FOREVER FOR YOUR PROGRAMS TO LOAD?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MONTY Plays SCRABBLE BRAND crossword game Leisure Genius
STILL LOADING
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EPYX PITSTOP II

INTRODUCING THE FAST LOAD CARTRIDGE FROM EPYX.

You're tired of waiting forever for your Commodore 64 programs to load. But it's no use glaring at your disk drive. Calling it names won't help, either. It was born slow — a lumbering hippo. You need the FAST LOAD CARTRIDGE from EPYX. FAST LOAD transforms your Commodore 64 disk drive from a lumbering hippo into a leaping gazelle. With FAST LOAD, programs that once took minutes to load are booted up in a matter of seconds.

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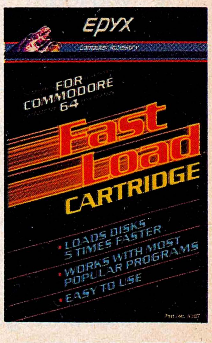
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EPYX™

SOFTWARE SCANNER

BY HILDE WEISERT

RELAX

(Synapse, Combined Atari/Commodore version, $99.95; Apple II, IBM PC and PCjr version $139.95. Optional workbook, $9.95)

You've had a rough day. Not only did you miss the bus, flunk an algebra test, and step in a mud puddle, but you've just discovered that you're locked out of your house.

Sounds like you need to *Relax.*

Like *Calmpute,* reviewed last month, *Relax* is designed to help you learn "stress reduction." It has the same basic parts: A *sensor* plugs into your joystick port and physically measures your level of relaxation. A *software program* charts that level on the screen. With this "biofeedback," you can learn to lower your graph—and your tension. Another program on the disk projects colored patterns that change as you calm down. And then there's a *game,* where you win by mellowing out.

Does it work? Also like Calmpute, *maybe.* But only if you use it, and keep using it. So it had better be fun and simple to use.

The good news is that *Relax's* relaxation audiotape is good. But this program does have some drawbacks—like the dull software. And for me, its sensor—a headband to pick up forehead tension—was harder to use than *Calmpute's* fingertip device. I thought the manual was too short and too general to help much with your practice.

Stress reduction programs aren't cheap, so make sure that you test the program before you buy it.

INCREDIBLE MUSIC KEYBOARD

(with software, keyboard and disk, $49.95)

MUSIC PROCESSOR

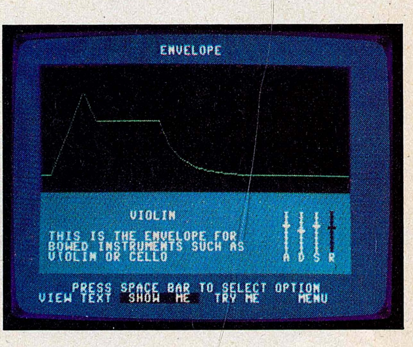
(disk, $34.95)

3001: SOUND ODYSSEY

(disk, $39.95)
(All three released by Sight and Sound for Commodore 64)

The latest thing in music packages for the Commodore is an add-on piano-type keyboard with software to play or record with. One of the best is Sight and Sound's *Incredible Music Keyboard.* This keyboard can be used by itself, but it also plugs you into Sight and Sound's line of music software.

The *Incredible Music Keyboard* is a sturdy plastic overlay that puts two octaves of piano keys over the top of your C-64 keyboard. The disk it comes with lets you play the keyboard just like a piano, except you can make the piano sound a hundred different ways. Two songbooks give you sheet music for 51 songs—some duds and some hits. Key stickers make playing easy, even if you don't read music. I liked being able to play three-note chords and add weird special effects.



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ENVELOPE

VIOLIN
THIS IS THE ENVELOPE FOR
BOWED INSTRUMENTS SUCH AS
VIOLIN OR CELLO

PRESS SPACE BAR TO SELECT OPTION
VIEW TEXT  SHOW  ME   TRY ME     MENU
```

One thing that you *can't* do with *Incredible Keyboard* is save tunes and play them back. To do that, you need the separate *Music Processor* disk. *Music Processor* lets you go from doodling around to actually writing and editing complex music programs.

But what makes Music Processor really fun are its seven music processing modes. For example, "Edit" lets you enter a song, then add lyrics that dance across the screen. The editing features are all easy to use, but very powerful. You can write, change and debug fancy three-track song programs without knowing programming. After you save your compositions on a disk, try the "Jukebox" mode. You can program the order of song playback—just like a jukebox.

One complaint: Although you can *enter* music with the *IMK*, you have to take the keyboard off to key in some editing commands.

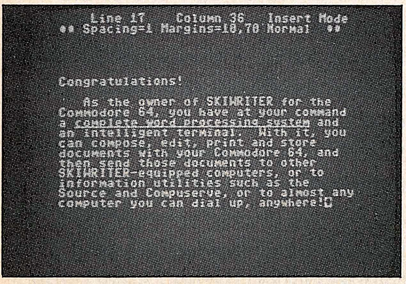
Sight and Sound's other programs include "albums" right off today's charts (*Video Hits, On Stage*). These albums are like the presets on *Music Processor,* only hipper. I played along with "Thriller," and made it even spookier with special effects (including my singing).

3001: Sound Odyssey was my favorite program. *3001* is an offbeat synthesizer-composer package. Its excellent tutorial will teach you not only how a synthesizer works, but how *music* works.

If you're looking for software that will let you feel like an MTV star, the *Incredible Music Keyboard* could be your entry into the musical software bag.

SKIWRITER II

(Prentice-Hall; Commodore 64 and IBM PCjr, cartridge, $69.95; advanced IBM PC and PCjr version, disk, $99.00)



```
      Line 17     Column 36    Insert Mode
  ** Spacing=1 Margins=10,70 Normal   **


  Congratulations!

     As the owner of SKIWRITER for the
  Commodore 64, you have at your command
  a complete word processing system and
  an intelligent terminal.  With it, you
  can compose, edit, print and store
  documents with your Commodore 64, and
  then send those documents to other
  SKIWRITER-equipped computers, or to
  information utilities such as the
  Source and Compuserve, or to almost any
  computer you can dial up, anywhere!
```

If our October issue made you dream about "Life On-Line," *SkiWriter II* may make your dream come true. On one ROM cartridge, you get a solid word-processing *and* "communications terminal" program.

SkiWriter II is a pleasure to use: simple, powerful, and fast. With a telephone modem and this first-ever software combo, you can write a letter, edit it, and send it to a friend. You can "download" (receive) text, format and print it. Easily!

With *SkiWriter II's* editing features, writing is a breeze. After only a minute to check out the plastic template around the function keys, *SW II* could mark, move, or cut out blocks of text; find and replace words and phrases; and zap all around my file.

There are lots of format and print options. A handy "Preview" feature lets you see just what they look like before you print.

With the terminal program, you'll feel like a pro your first time out. And it even keeps track of how long you're on line. Start-up, modem use, and details are well covered in a 48-page manual. And you can get on-screen help if you need it.

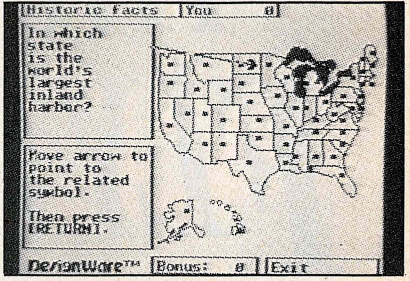
Commodore and PCjr users, stand up and cheer: *SkiWriter II* is a cartridge. You don't need a disk drive. It loads *instantly.* But watch out! You'll never be able to use the old homework excuse, "The dog ate my software." Cartridges are *tough.*

STATES AND TRAITS

(DesignWare; Commodore 64, Apple II and IBM PC; disk, $44.95)

Usually, geography's about as much fun as scrubbing the kitchen floor with a toothbrush.

But—honest!—here's a game that can make learning all about U.S. geography and state facts ("traits") a fact-filled, fun-filled challenge.



In which state is the world's largest inland harbor?

Move arrow to point to the related symbol.

Then press [RETURN].

States and Traits is really three different games. All of them are enjoyable and engaging for one or two players.

In the first game, you use your joystick or cursor keys to move outlined states to where they belong on the map. Match them correctly, and the state gets colored in—and you get points. But drop Illinois where Nevada should go, and the program corrects you, then deducts points. When the game's over, it lists the states that you missed and tallies up your score.

In the second game, you match states with questions about capitals, current and historic facts, border states and land forms. Feeling unsure of your U.S. knowledge? You can bone up in advance by using the "Review" option.

The section I liked best was "Make your own game." Here, you write your own questions. This is a great way to study for social studies or make up family trivia quizzes.

States and Traits should still be fun long after you've memorized the capitals of Iowa, Indiana and Idaho.

HILDE WEISERT is an educational consultant and freelance writer.

THE INCREDIBLE FLYING CAMERA

BY DOUG GARR

COMPUTERIZED SKYCAM BRINGS NEW VIEWS TO SPORTS COVERAGE

You've seen the view from high above a football stadium before. But have you ever flown through the goalposts like a football?

Be prepared to fly with Skycam, a computerized camera that soars through the air on steel cables. Skycam, which was used at several pro football games this year, has been a hit in its first high-flying performances. It may be used at this month's Super Bowl game. And, if all continues to go well, you can expect to see a lot more of Skycam during 1985. Plans call for its use at soccer matches, skiing and other sporting events, and in the making of movies, television commercials, and even music videos.

"It gives us almost more freedom than we know what to do with," says Skycam's inventor, Garrett Brown. His flying camera can follow a sprinting receiver downfield, hurtle off the edge of a ski jump, or hover above an ice skater performing a spinning dance.

Even TV cameras mounted in a blimp can't do that.

LEARNING TO FLY

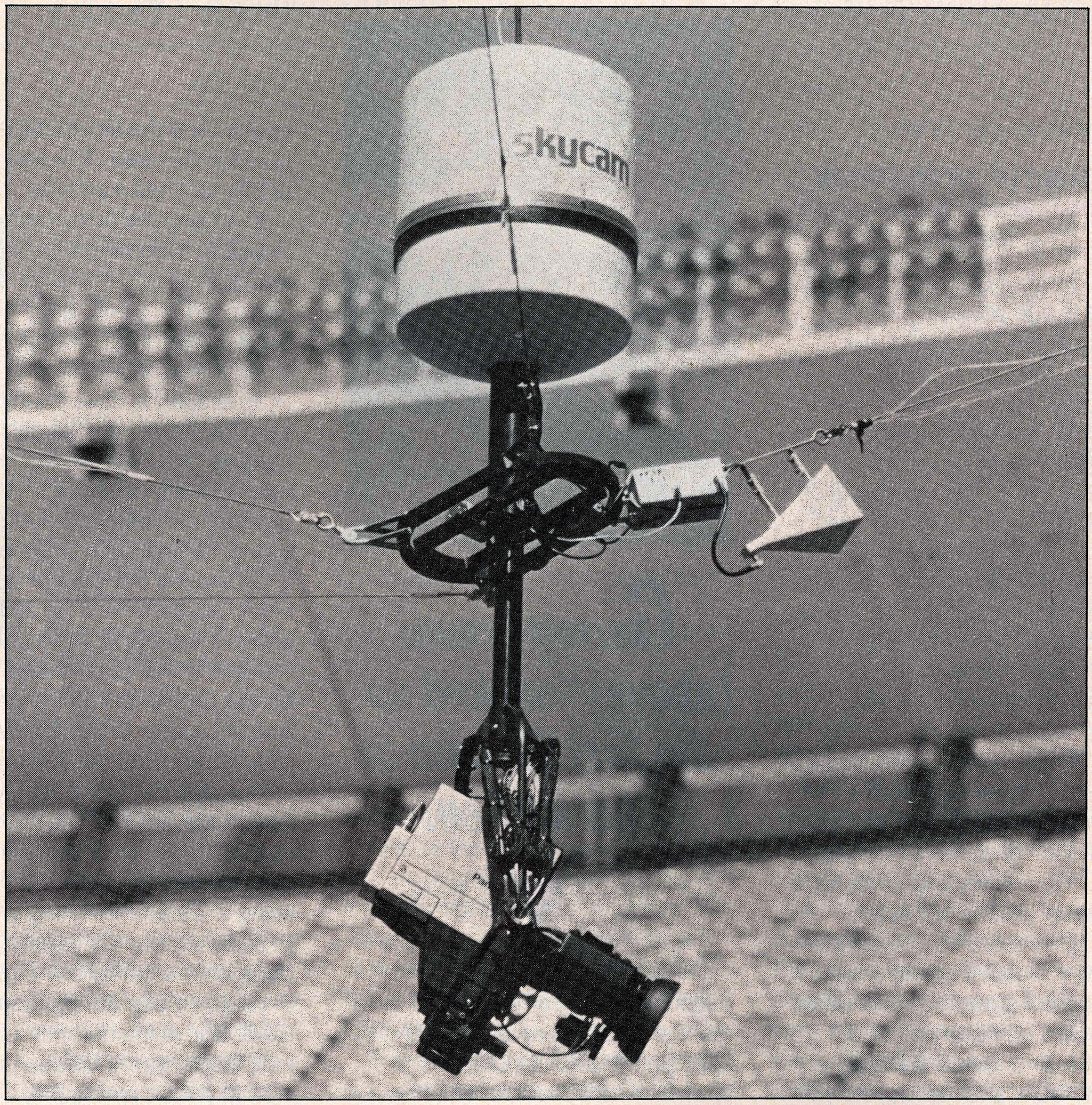
"The wonderful thing about Skycam," says Garrett, "is that it lets you put a lens where no camera could ever go before." Garrett, 42, is a cameraman and computer technician whose inventions have already hit the mark at the movies. In 1978, he won an Oscar for inventing the Steadicam, a camera that remains steady while camera operators run, jump and move around. This invention helped create special effects in movies like *Return of the Jedi*, where it was used to film the forest chase sequence.

Garrett's newest invention is a complicated system. Skycam's lightweight camera glides on a set of heavy-duty steel cables attached to four points around a stadium or other arena. These cables, connected to four microprocessor-controlled motors, move the camera through the air. The whole system is controlled with a Sage microcomputer and two joysticks. The Skycam unit weighs around 30 pounds, and can travel through the air at a speed of 25 MPH.

HOW SKYCAM FLIES

Two pilots (or operators) are needed to work Skycam. One pilot uses a joystick to control the way the camera flies. The other operator controls what Skycam will film. This pilot uses another joystick to turn the camera left and right, up and down, and to focus, zoom, and pan the lens. "It's like playing a two-handed video game," says Larry Cone, who helped write the software that controls Skycam.

The Sage microcomputer used



to control Skycam is not that different from a regular home computer. It has 256K bytes of Random Access Memory—which was actually more than the programmers needed. The Sage is programmed in FORTH, an advanced language that uses five times fewer commands than BASIC.

> ***Skycam soars into action—taking you where no camera has ever gone before.***

Skycam's computer program doesn't just control camera movements. It also lets operators store a particular camera angle in the machine's memory. Once a series of joystick movements has been recorded into the computer, these movements can be repeated by simply pressing a button.

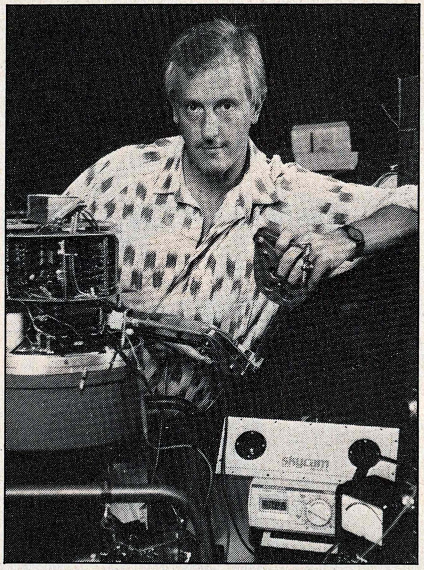
The picture from the Skycam camera travels by audio-video microwave signal back to the ground crew. In a split second, this signal is sent along fiber optic cables to a camera truck. From there it is transmitted to your TV set.

COOKING UP AN INVENTION

Skycam didn't just come out of thin air. Brown got the idea about five years ago while filming an episode of the TV series *Little House on the Prairie*. He was talking with Merlin Olsen, the actor and former football star, about how it was impossible to get certain camera angles. This conversation stuck with Garrett, but two years passed before he had a chance to start developing Skycam. His first efforts were simple, but they proved to him that a "flying camera" system could be built.

"I tried the theory out in my kitchen," Garrett recalls. "I used sewing thread and a quarter-inch bolt. It was suspended from a microwave oven, the sink, the kitchen door, and the refrigerator handle." By raising and lowering the different pieces of thread, Garrett discovered he could move the bolt ("camera") to just about any position he wanted. Soon after, he formed a company named Skyworks, and raised enough money to build and test a prototype.

Garrett tested Skycam at a high school athletic field, and then at Veteran's Stadium in Philadelphia. But those first tests weren't exactly a field day. All kinds of things went wrong. During one test, the camera seemed to have a mind of its own. It flew everywhere but where Garrett wanted it to. A programmer had misplaced one number in the Skycam operating program, and it took all afternoon to find that tiny error. Meanwhile, Garrett recalls, "Yours truly succeeded in crashing the prototype."



© J.T. MILLER

Garrett Brown (above) "cooked up" the first Skycam in his kitchen.

Other problems, including difficulty getting all the equipment and cables at the right time, kept Garrett and the Skyworks team behind schedule. The first working model of Skycam was supposed to be ready for the February 1984 Winter Olympics. But bugs in the system kept the Skyworks team from unveiling Skycam during the Winter *or* Summer Olympic Games.

Brown's team also tried using a Skycam prototype in early 1984 during the making of Robert Redford's baseball film, *The Natural*. Redford wanted Skycam to follow the flight of a home run. But the frame that held the camera wasn't solid enough. The picture jiggled and the film footage couldn't be used. The new version of Skycam has a sturdier frame.

Even with the new improved Skycam, a looming problem remains: all that equipment hanging in mid-air could get in the way, especially during football games when there's a high kick or pass.

"Precautions have been taken," says Garrett. The National Football League (NFL) has already set up rules that affect where and how Skycam can be used during a game. For instance, if the camera is positioned behind the quarterback, Skycam must be 20 feet above the ground. If the camera is over the line of scrimmage, it must be at least 50 feet off the ground. And if it is over the defensive team, it must be 75 feet above the field.

"You don't want a ballplayer seeing the ball and the camera approaching at the same time," says Garrett. "You don't want him trying to catch the wrong one."

Some further testing has to be done before the NFL will approve Skycam for use during the Super Bowl. But, in the meantime, you can look for Skycam's unique point-of-view in an upcoming Billy Squier music video and a Cyndi Lauper concert video, in a Lionel Richie commercial for Coca-Cola, in movies like *A Chorus Line*, and in other sporting events.

How will you know if it's really Skycam?

Well, if you're watching TV and the scene on the screen has you zooming through the air, you'll know Skycam is at work.

You'll know, that is, if you can see with your hands over your eyes! ⊑

DOUG GARR is a freelance writer

TV TECH: *TODAY'S SPORTS COVERAGE IS A WHOLE NEW BALLGAME*

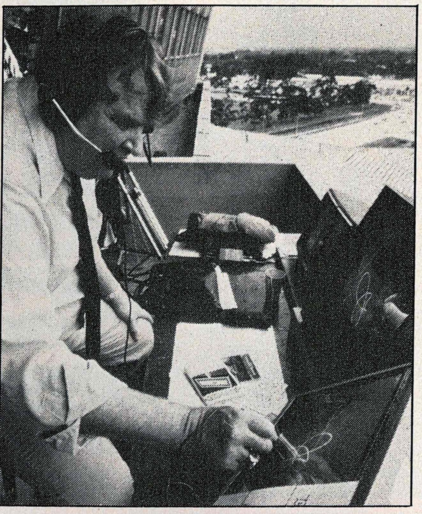
'One of these days, they'll come up with a camera an inch long, and we'll stick it on the football," says Chet Forte, director of ABC-TV's *Monday Night Football*.

That day may be here soon. Microchip technology is already making cameras, microphones and other broadcast tools smaller than ever. And TV is using this technology to give sports coverage a new look. Whether scanning the field from a Skycam-point-of-view, or watching a big catch on instant replay, computers are there, putting you into the action.

"In the last five years, sports television has been taken over by computers," says Dwight Morris of CBS Engineering Department. "Every major piece of equipment has microprocessors in it."

Computers in the control room let directors know instantly what's happening with the dozens of cameras, monitors and videotape machines used to cover a sports event. Staying on top of the action is crucial. For instance, when a 30-yard touchdown pass is tossed down the sideline, the director can check a computer console to tell which camera picked up the action. Then, using the computer built into a videotape machine like the Sony 2000, the director can replay the action instantly.

Computer technology has also changed the TV camera. "In the old days, we had to fine-tune cameras manually," says NBC cameraman Lenny Basile. "Now they're computerized. We can go in tighter and go out wider more easily." But, Basile insists, machines alone can't do the work: "A cameraman is like a ballplayer. If he's a good hitter, he's a good hitter no matter what. A good cameraman makes any equipment work."


COURTESY OF CBS

Madden: Master of the chalkboard

One of the best "hitters" when it comes to using new technology is CBS announcer John Madden. John, a former football coach, is a master with a device called a telestrator—better known as the CBS chalkboard.

The chalkboard lets John draw play patterns right on the screen. It's not new; telestrators have been around for almost 10 years. But, says CBS executive producer Terry O'Neil, "There was no one with John's level of sophistication holding the stylus.... After 20 years of coaching, he's used to talking and writing at the same time."

When Madden uses the chalkboard, the control room calls up the play on a videotape machine. The play is then shown in a freeze-frame on a special monitor in the announcers' booth. As Madden draws on the monitor, the stylus works like a light pen. It creates lines that are superimposed onto *your* TV screen. When John is done, he presses a button to erase the lines. That signals the videotape to roll.

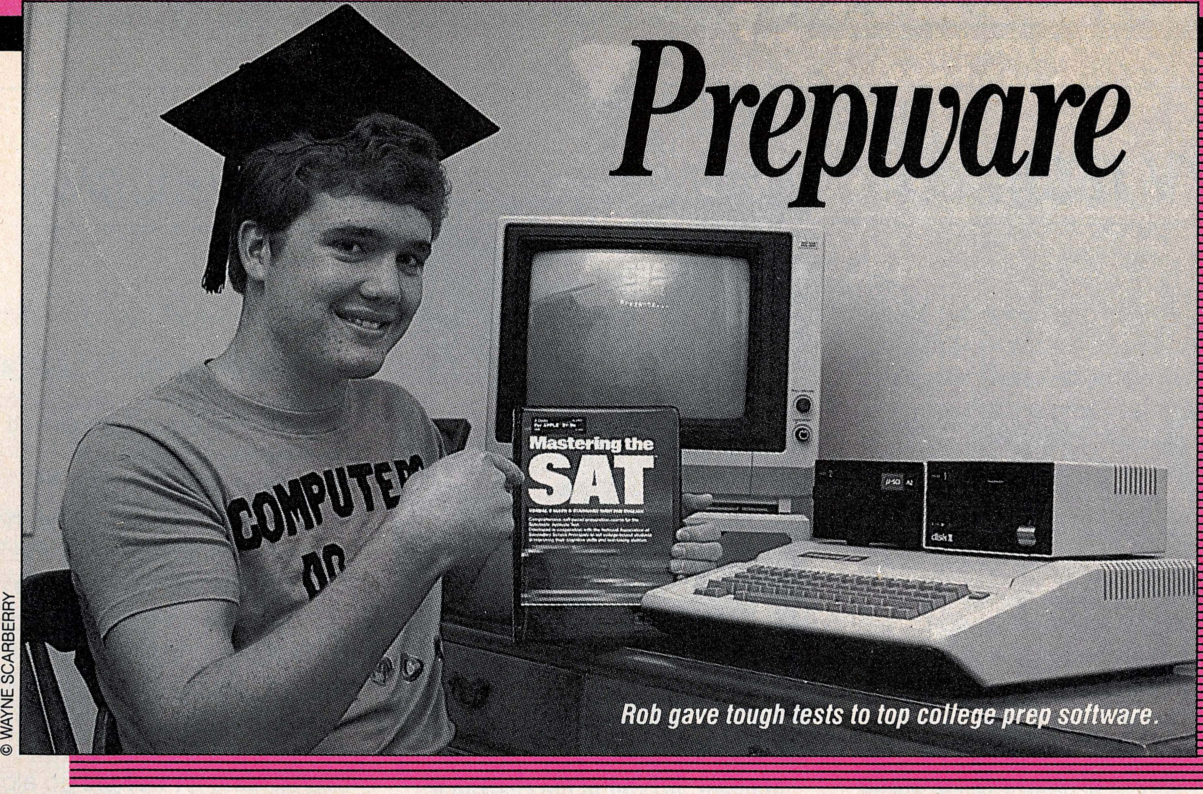
TV football coverage may be the biggest innovator but it isn't the only sport getting a new look:

- At the 1983 Daytona 500, a microchip-run camera and microphone let viewers go along for the ride in the winning car.
- At the New York and Boston Marathons, camera crews use an electric truck to ride in front of the runners. This gives viewers a close-up view without spewing gas fumes.
- At the Belmont Stakes horse race, a mini-camera is mounted in the gate so you can see the start of the race from the rider's seat.

What's next? TV experts like producer Tony Verna predict we may soon have electronic signal seeds implanted in footballs and baseballs. These seeds will let cameras follow the action instantaneously. And someday, tiny cameras in the quarterback's helmet might show how the field looks before the ball is snapped.

Some sport experts worry about all this technology. "Sometimes we overdo it," says Beano Cook, ABC's college football analyst. "In this business, when you get a new toy, everybody wants to play with it. All this technology can detract from the telecast." But even Cook admits there's one machine he'd like to see: "The technology everybody wants is a computer that tells you who is going to win." ◻

Prepware



© WAYNE SCARBERRY

Rob gave tough tests to top college prep software.

RATING THE TOP COLLEGE S.A.T. PROGRAMS

BY CAROLYN J. MULLINS AND ROBERT C. MULLINS

"If I've gotta study, I'd rather do it on a computer," says Rob, my son. He prefers sports to books. But he also wants the best scores he can get on the college boards—otherwise known as the SATs (Scholastic Aptitude Tests). Fortunately, there's computer software available that promises to help him study for the SATs.

This software is aimed at 14-, 15- and 16-year-olds who will soon be taking the PSATs or SATS. But even if you're not planning to take the SATs for a few years, these programs can help you build vocabulary, sharpen math skills, and strengthen writing skills.

As you'll see, there's a lot to choose from. We've tried to show each program's strong and weak points. In the spirit of schooling, we've given each a grade. If we disagree, we'll tell you.

ACI *(American College Testing Program, $180; three disks and one manual.)*

The designers of this program believe that test simulations aren't accurate and may not help you learn. So, instead of simulations, they offer a review of common mistakes and ways to avoid these mistakes. When the review is over, the questioning begins. Whether you answer right or wrong, you get an explanation of the correct answer.

We liked the way this program divides topics. For instance, the math section is divided into basic algebra, geometry, problems, etc. This strategy helps you zero in on what you want to study most. Unfortunately, the program doesn't store your results.

GRADE: A –

College Board SAT *(Krell, $300; six disks and a manual.)*

Krell software's strong points include an automatic learning feature that tracks your progress and then generates specially-tailored questions to help you with problem areas.

Rob and I also liked this program's randomization feature. Each time you take a test, you get slightly different questions in a different order.

Best of all, Krell promises to refund your money if you use their software for at least six hours and don't improve total SAT results at least 70 points over your previous score. "This program needs some simulated tests like *Mastering the SAT,*" says Rob. "Still, using it is more interesting than using most of the other programs."

MY GRADE: B +; ROB'S GRADE: C

Computer SAT *(Harcourt, Brace Jovanovich, $80; four full- length exams, 540 drill items, and 1000 electronic, vocabulary-building flashcards.)*

Computer SAT's flashcards earned Rob's highest praise—"Awesome!"

"Unfortunately," he adds, "the pre-test isn't so hot." This program's questions come from a workbook. You type the answers in an on-screen test sheet.

"You don't need a computer for this," Rob groused. "It's faster to answer on paper, then check with an answer sheet." After you finish plugging the answers into the computer, the program figures a score, and designs a personal study plan. This program isn't fun, but it gives you a comprehensive study tool at a reasonable price.

GRADE: B–

Computer Study Program for the SAT *(Barron's $90; Two workbooks, one textbook, one manual, and three double-sided disks)*

This package has four full-length practice tests, and gives you feedback on each question. It also offers timed tests, and suggests lessons based on your score.

However, the *Computer Study Program* uses questions in a book instead of on a disk. We think that's a pretty dull way to use a computer. "You get confused switching from question to question, from computer to book and back," Rob says.

GRADE: C+

Improving College Admissions Test Scores *(NASSP, $184; seven disks and one manual.)*

Whether your answer is right or wrong, this program offers encouragement. If you get the right answer, the word "Correct" flashes diagonally across the screen. If you make an error, the program offers hints and a detailed explanation of what you missed.

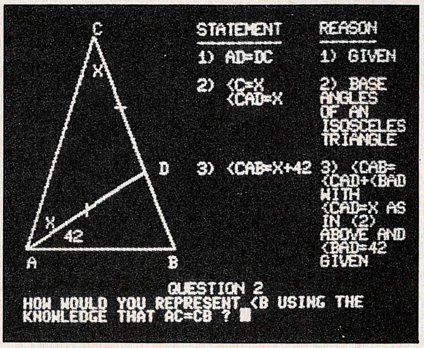
We didn't like the screens in the verbal section because they seemed crowded. But the math section was Rob's favorite. It comes with on-screen graphics that help in problem-solving. For instance, one math question plots a path across two chunks of land at different heights. Simple graphs plot the possible answers. Even 25 years away from trigonometry, I could start a problem without a clue and gradually figure out why, using these graphs.

GRADES: A– math; B+ verbal.

Mastering the SAT *(CBS and National Association of Secondary School Principals, $150; One workbook and four disks.)*

We liked the fact that questions appear on screen and not in a book with this program. We also liked the way the program analyzes your performance after testing and goes over the answers with you.

When you're reading a lot on the computer screen, it's important that the type is easy to read. The screens in this program are well done, with enough open space to separate questions from answers.



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STATEMENT        REASON
1) AD=DC         1) GIVEN
2) <C=X          2) BASE
   <CAD=X        ANGLES
                 OF AN
                 ISOSCELES
                 TRIANGLE
3) <CAB=X+42     3) <CAB=
                 <CAD+<BAD
                 WITH
                 <CAD=X AS
                 IN (2)
                 ABOVE AND
                 <BAD=42
                 GIVEN
          QUESTION 2
HOW WOULD YOU REPRESENT <B USING THE
KNOWLEDGE THAT AC=CB ? █
```

Mastering the SAT ***gives sample tests.***

"The Test of Standard Written English is especially good," says Rob. "But I need more than two tests."

Basically, this software is well-designed, has excellent tests and tips on test-taking. It can also store results for up to three people. But we'd have liked it better if it had had more practice tests and changed the order of questions when we retook a test.

GRADE: A–

Owlcat *(DRI, $90; 15-hour course, 1 manual, 4 disks; $250 for 60-hour, 9 disks and 4 manuals; $20 for PSAT pretest, 1 manual and 1 disk.)*

I think Owlcat is a diamond in the rough; Rob doesn't.

I think it offers many of the advantages of the Krell software, but at a lower cost. Rob is not convinced.

The software features three modes: learning (with or without cheers for right answers), drill (questions and answers only), and review (questions, answers, explanations and a dictionary).

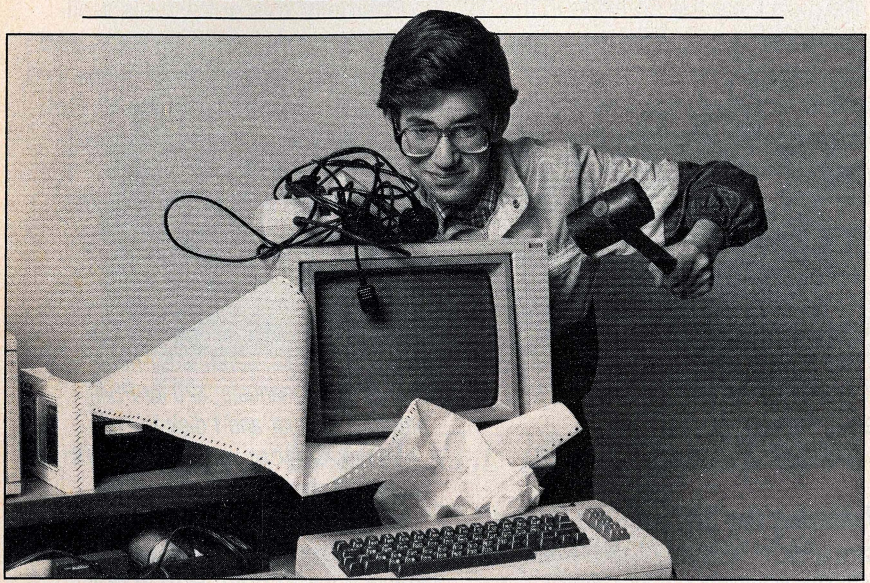
There's also a game mode. But Rob didn't like this. "It just feeds you vocabulary words and asks for opposites," he says. "If you get them right, it calls you 'a genius.' If you don't, it tells you 'even geniuses don't get everything right.'"

Rob wasn't crazy about the vocabulary section, either. It only defines words, and then gives practice sentences. Over and over.

GRADE: C– ⊡

CAROLYN MULLINS is a freelance writer in Virginia. ROB MULLINS, 17, is a senior in high school.

WITH FRIENDS LIKE THESE…



© RANDY MATUSOW

Friendly? If computers are user-friendly, then I'm Indiana Jones.

BY CHARLES ARDAI, 14

Everybody talks about computers and software being "user-friendly." But in all the time that I've been using computers (I started four years ago), I've *never* run across a friendly computer. No matter how costly or fancy they are, I've always found computers to be downright *un*friendly.

Take almost any computer keyboard, for instance. Look at where the keys most likely to harm your program are placed. Have they thoughtfully been put somewhere where you'll never hit them by mistake? No way. Usually, they're directly below or above RETURN, or some other frequently-used key.

On my Commodore keyboard, the DELETE key is right next to HOME, the key that sends the cursor back to the beginning of a document. So, whenever I make a typing error (which happens a lot), I *try* to tap DELETE to erase it. Instead, I usually end up hitting HOME. I end up typing over everything I've already typed, totally ruining my document. Pretty annoying.

It's not Commodore's fault; other computers are just as bad. The Atari 400 crams all of its most important and dangerous keys together in a tight little corner. It's almost as if the computer is daring you—*try* and hit the right key! And many other computers force you to memorize strange patterns. They require you to use the RETURN key for capital letters, and the FUNCTION key for symbols and numbers. This often requires greater finger coordination than any human could possibly have. So much for "easy-to-use" keyboards.

Error messages also drive me crazy. Why is it that so often they just don't make sense? "Syntax Error" and "Out of Memory Error" are okay, but what can you do when confronted by "Formula Too Complex Error" or even worse, "Internal Error #3541 (a)-7?" It's bad enough that your program doesn't work. You certainly don't need the computer to display some indecipherable message.

That brings me to computer languages in general. Why do they have to be so weird? Even the simplest programming language, like BASIC, is difficult for a person with little computer experience to understand. You'd think that somewhere along the way, *someone* would invent a language for the computer that really is in English.

And how about green screen monitors? They have to be one of the worst things to stare at for long periods of time. Try reading long programs off a green screen sometime. You'll probably end up with typographical errors and a splitting headache. And what looks good in glowing green, anyway?

Don't get me wrong—I *like* computers. I've had fun with them, once I was able to figure out their quirks and habits. But as for user-friendliness—well, all I can say is that dogs have nothing to worry about. The computer will *never* replace them as my best friend.

Charles Ardai lives in New York City.

PENCIL CRUNCHERS

PERPLEXING PIXELS

BY SUSAN JARRELL

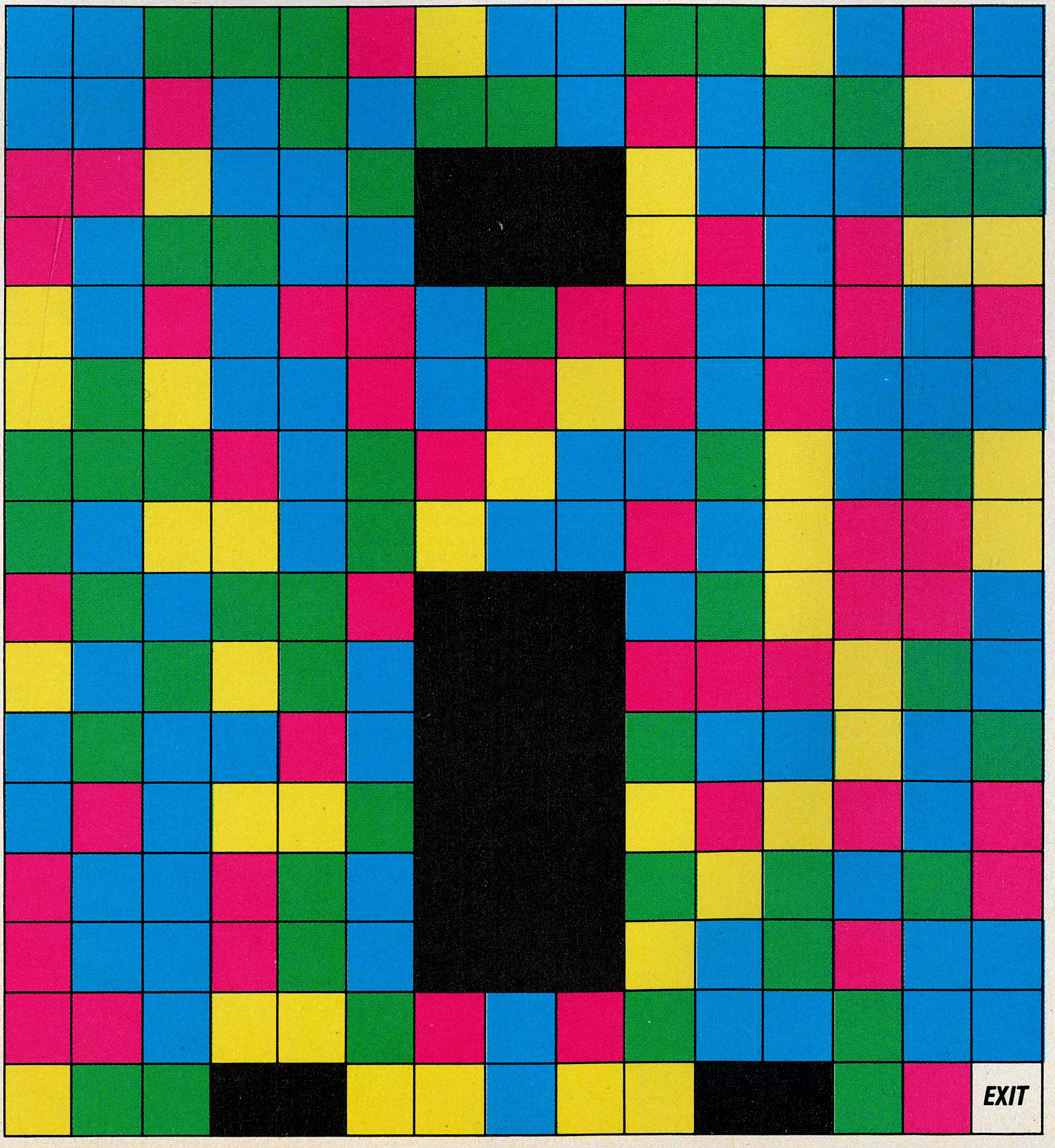
This screen filled with colors actually is a maze. Every pixel block is color-coded, telling you which direction to move in. To play, start at any square in the top row. Using the color key at right, maneuver your moves until you get to the "EXIT" pixel box.

Be careful! The black boxes are bugs. Landing on one means you've got to start over. And beware of the endless loop, which will send you around and around and...well, you get the picture.

*(Answers on page **40**)*

KEY

⬛ BLACK = Begin again!
🟥 RED = Move one RIGHT
🟩 GREEN = Move one LEFT
🟦 BLUE = Move one DOWN
🟨 YELLOW = Move one UP



🟦	🟦	🟩	🟩	🟩	🟥	🟨	🟦	🟦	🟩	🟩	🟨	🟦	🟥	🟦
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🟥	🟥	🟨	🟦	🟦	🟩	⬛	⬛	⬛	🟨	🟦	🟦	🟦	🟩	🟩
🟥	🟦	🟩	🟩	🟦	🟦	⬛	⬛	⬛	🟨	🟥	🟦	🟥	🟨	🟨
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A KATIE PARKER COMPUTER MYSTERY

THE CASE OF THE CRYSTAL CAT

BY DAVID BENSON POWELL

CONCLUSION

The story so far: A burglary ring has swept into Katie Parker's home town. Twenty homes have been broken into—including Katie's own. When Katie surprised the robbers, they left behind a small statue of a crystal cat.

To track down the thieves, she used her computer to plot other Winter Harbor robbery sites and places where similar "gifts" had been left behind. A complex pattern appeared. Katie and her best friend Don found two possible hideouts.

That night, Katie and Don split up and went looking for the hideouts. Katie found an old farmhouse. She crouched behind a bush. She'd noted the license plates of two vans nearby, when her digital watch alarm went off—a reminder to check with Don. But as Katie backed away, she stepped on the foot of a very big man. Will she escape? Find out here, in the conclusion of "The Case of the Crystal Cat."

"Well, well, what do we have here?" a voice snapped. It was the same voice Katie had heard in her house on the night of the robbery. Two huge hands grabbed her. The man carried Katie under his arm toward the farmhouse. She bounced helplessly.

"Hey Lex," her host shouted toward the house, "we've got a snoop."

A door opened and Katie could see three men in the shadows. Two were holding up jewelry and arguing with the third—a man in a business suit.

Katie was trying to think of a way out when she remembered a karate class she'd once taken. Tucked under this behemoth's arm, she was left with only one possible attack—she could batter the guy's kneecaps. She doubted that would help. Then she remembered the instructor's First Lesson of Self-Defense. It was simple: "If you can run —— run!"

"That won't help much now, but maybe later," she thought. Then she recalled the Second Lesson of Self-Defense: "If you can't run, use *anything* at hand."

That seemed like good advice, but the only nearby object was a tree. As they went by the tree, Katie folded her knees toward her chest and then snapped her legs straight back out toward the tree trunk. Her heels hit so hard she rocketed out of the crook's arm.

Now for Lesson One: "Run!"

Katie ran through a field of tall weeds towards the woods. Two thieves were hot on her trail. She reached the woods and ducked behind a tree. Crouching low, she swiftly crept away toward a distant road. She kept an eye on the crooks in the field. They seemed to think she was still hiding there.

"Crafty burglars, but lousy trackers," Katie thought as she crept along back toward town. A feeble light glided silently into view. Katie hid until she recognized Don, pedaling his bike toward the farmhouse to find his missing friend.

"Look kids," Sheriff Newhouse pleaded, "I can't go bursting into old farmhouses to arrest people, simply on your say-so." He was playing with the pins marking robbery sites on his wall map as he spoke. "And what proof do I have they *are* the crooks?"

The sheriff leveled a double-barreled stare at Katie. "Besides, let's say they *are* who you say. They'll have moved to another hideout by now. So let me handle this." Newhouse settled in behind his desk, and said "I'll give those license-plate numbers and van descriptions to my officers, and we'll keep a lookout for them."

The sheriff leaned back in his chair and sighed.

(Continued on next page)

"Now if you kids had a crystal ball that could tell where the crooks will strike next, we might be able to do something. But these crooks are pros. That guy you saw in the business suit was probably their 'fence,' a buyer for their stolen goods. Those guys mean business, so no more night raids, OK?"

Katie and Don nodded and left.

"Funny," Newhouse mumbled, "I didn't hear a 'yes' in that nod."

As they walked out, Katie chuckled. "I think Newhouse is about to start believing in crystal balls."

"What?" said Don.

"I think we really *can* predict the next robbery location with Sherlock's data," said Katie.

"We've already gotten too close," Don said.

Back at her house, Katie powered up Sherlock while Don got critical supplies—cookies and milk. Sherlock's screen filled with the map of Winter Harbor. Katie replayed the robbery sites. The robbers hit one side of town, then the other.

"This is our crystal ball," Katie said.

"I get it," Don answered while munching a cookie. "The robbers last hit the north end of town, then jumped south...then north and south again. And with every jump, they had moved a little further counterclockwise."

"Right," Katie agreed. "Sherlock can calculate how long their jumps usually are, and how much they usually shift. Then my trusty computer can predict the line for the next jump. That line should lead us straight to the next robbery."

Katie turned to Don. "Give me a cookie, please." As she munched, she wrote a small program to take Sherlock's robbery data and predict the robbers' next move. By the time the cookies were half gone, Katie had finished.

The line Sherlock predicted ended at York Road. Katie asked Don: "Do you remember how we double-checked those two hideout locations?"

"We used the points where stolen loot—like the crystal cat—reappeared as gifts."

"Right," she said, calling Sherlock's robbery data to the screen. "There were three robberies in the south part of town on Wednesday. Sherlock has shown that the loot tends to reappear three days later. That means some should resurface tonight."

Katie redisplayed the town map and plotted Wednesday's robberies. "These points are where stuff was taken Wednesday," she continued. "Now *where* might some of this loot appear tonight? According to Sherlock's data, stolen property reappears within four miles," said Katie. "So let's plot all the points four miles from Wednesday's robberies." She entered a few lines of code. A circle formed around each of three robbery sites. The circles overlapped around York Road.

Katie grabbed a cookie and sat back in her chair. "Yes, I think Newhouse should check out the York Road area tonight...don't you?"

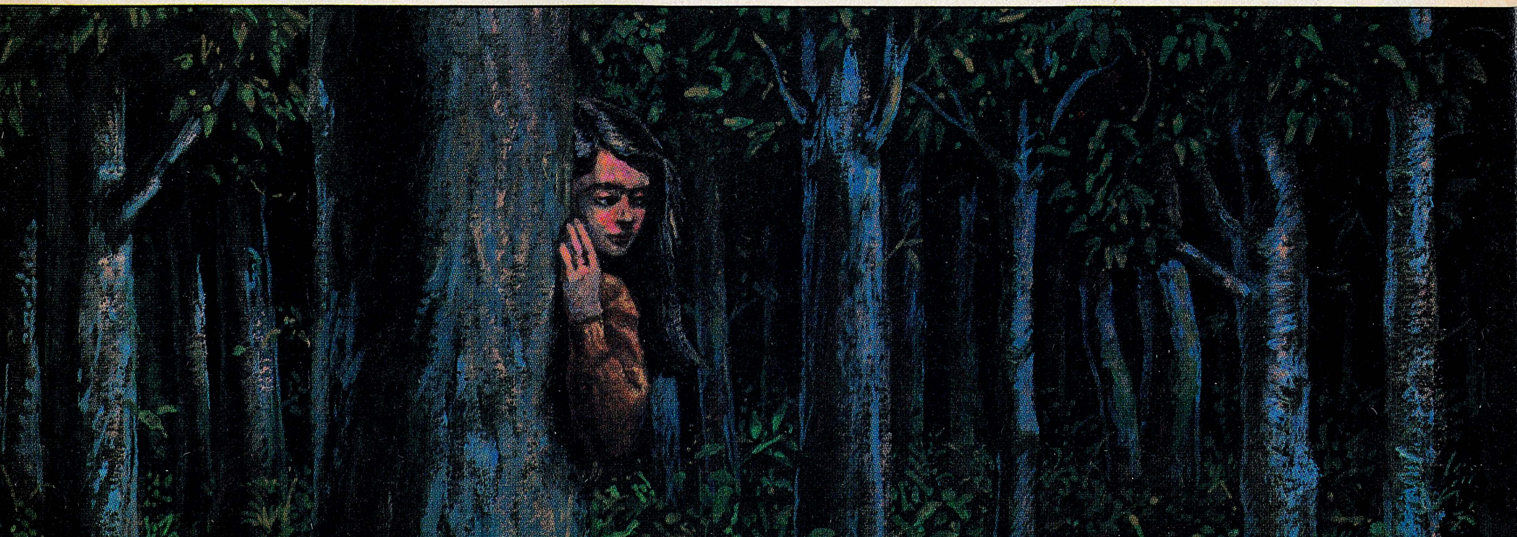
The next morning, Katie had to explain to Sheriff Newhouse how she came by her prediction before he would take her seriously. That wasn't easy, but Newhouse could see some truth in Sherlock's numbers. The Sheriff and Sergeant Molloy would patrol York Road that night.

"Of course, they'll need help," Katie told Don after Newhouse and Molloy left. "They can't possibly cover the entire York Road area. I'll come over to your place tonight at eight."

Don had hoped Katie would be late, but she arrived right on time. It was already dark.

Don held a flashlight on Katie's street map while she

* * *



With two crooks in pursuit, Katie ran to the woods and hid behind a tree. Usually, she didn't like the dark. Tonight it felt safe.

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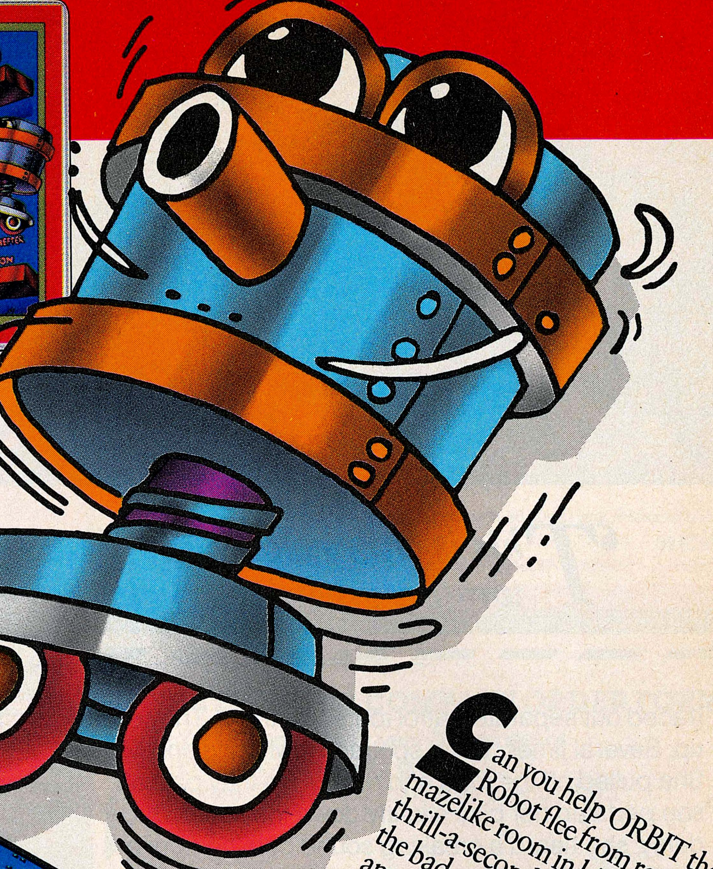
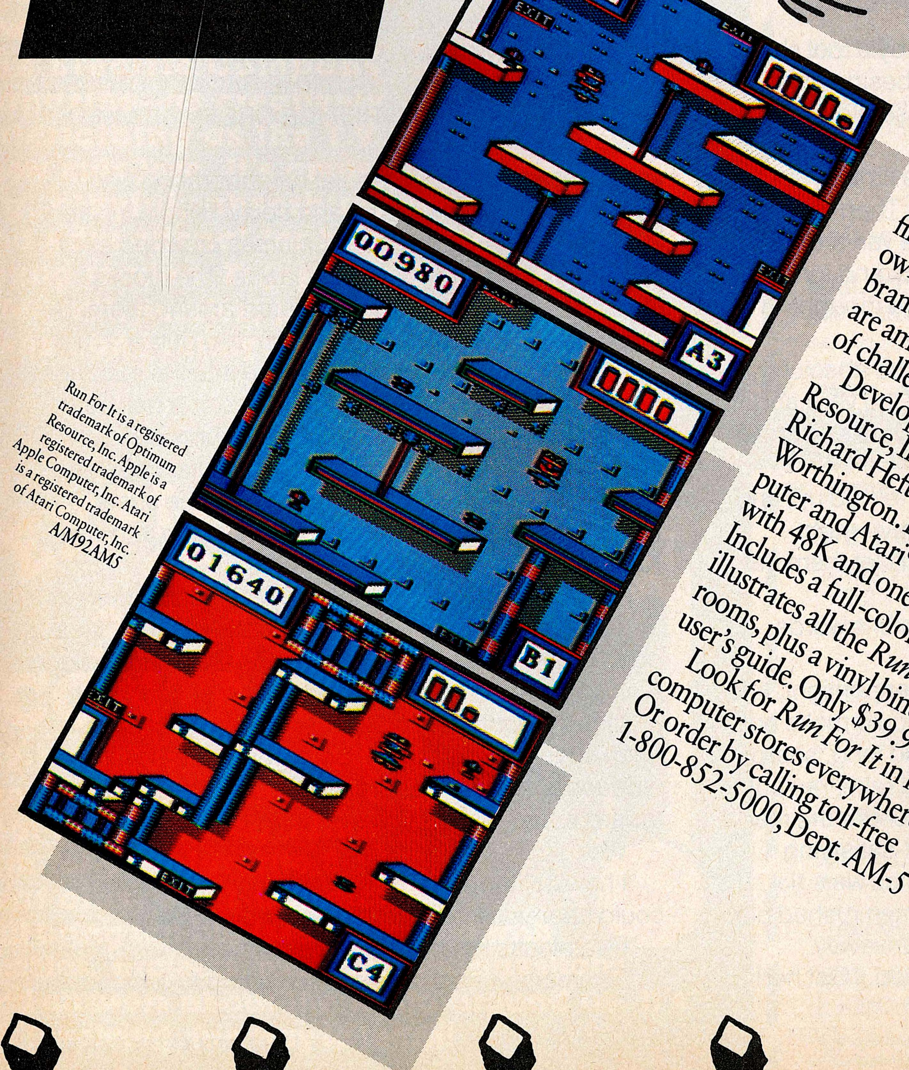
RUN FOR IT
BY RICHARD HEFTER AND STEVE WORTHINGTON
Weekly Reader Family Software





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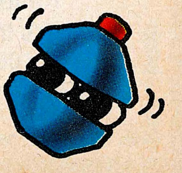

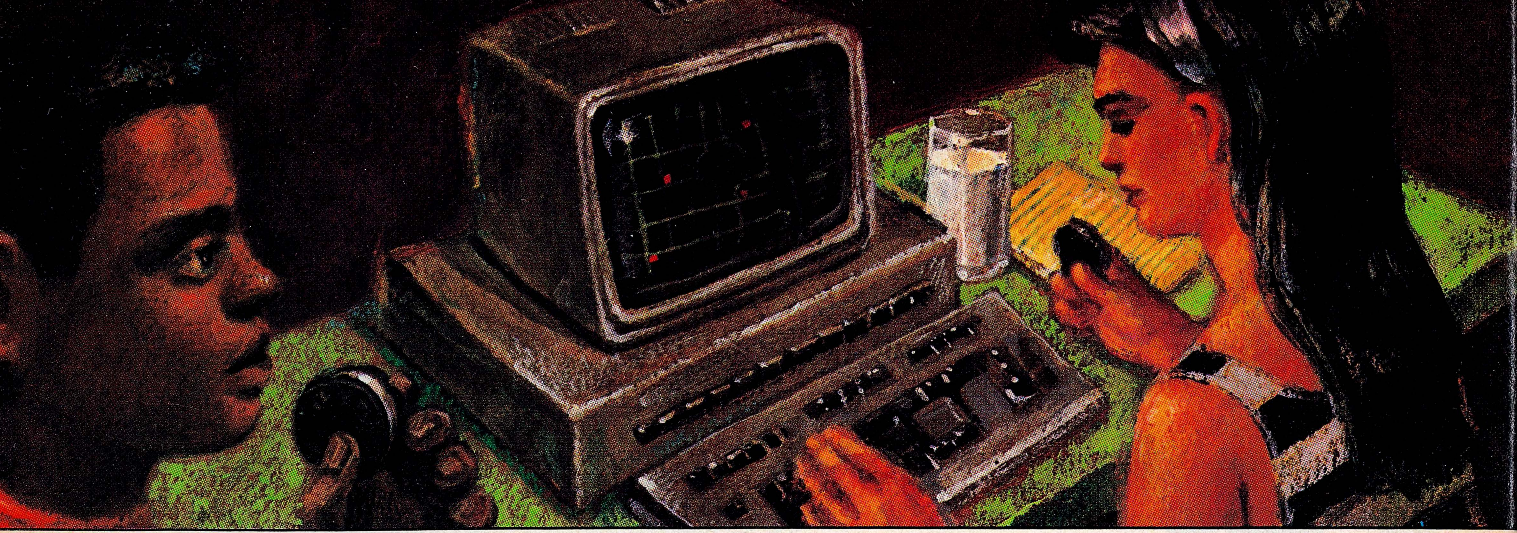

'This is our crystal ball,' Katie said. She munched a cookie and wrote a program to help the computer predict the next robbery.

traced out separate patrol routes for them. They split up. Several times, Katie spotted Newhouse and Molloy. She pulled off the road and hid. When they passed, she pedaled her bike silently down the street. Suddenly, she heard a creaking sound coming from a nearby yard.

There in the yard, blocked from view by a tool shed, was a dark-colored van. It was parked beside an unlit house. Katie tried to see the van's license plate. The tool shed was in the way.

Katie checked her digital watch. This time, she made sure the watch's alarm wasn't on. Then she stared into a dark passage between the van and the house. Vague, dark shapes moved back and forth. "They must be loading up their loot," she thought. "They might be ready to leave."

Katie had to see the license plate, to be absolutely sure they *were* the crooks. She crossed the yard and slipped inside the shed. Through a window, she could see the van's plate...It was them!

The men got into the van, the engine revved up, and the van began to back down the driveway—right toward Katie's hiding place. She couldn't let them get away. How could she stop them?

Again, she recalled her karate instructor's words: "Use anything at hand..."

In a tool shed, tools! She turned on her penlight, and played it around the shed's walls. She could make out a rake and a garden tiller. They each had long, sharp, metal teeth. Katie grabbed the tiller and rake, ran out behind the van and jammed their teeth under the rear tires. The metal teeth sank in with a soul-satisfying "hiss" of escaping air. In seconds, the tires were flat. The van's doors flew open. Four angry men rushed out.

Katie was already running down the driveway.

"It's the snoop again!" one man shouted. "Get her!" Four large bodies ran into the street after her. It wouldn't be long before they caught up. Katie needed help, but nobody was around. The men got closer.

Her only hope was to draw attention.

"FREE ICE CREAM!"..."FREE ICE CREAM!"...she screamed all the way down the street.

Doors and windows opened. People were shouting: "SHUT UP, WILL YA?"..."CUT THE RACKET, OR WE'LL CALL THE POLICE!"..."FREE ICE CREAM?...WHERE?"

The once-quiet neighborhood was now bright and noisy. People in street clothes and pajamas crowded excitedly onto front lawns. The crooks stopped and stared around them. Before they could run, two police cruisers—sirens blaring—squealed into the road from either end. Newhouse's car screeched to a halt near Molloy's—boxing the crooks neatly in between.

Katie stopped. People and bright lights, cops and robbers filled the road. At the far end of the street, Don's single, weak bicycle headlight came into view. Katie sat on the curb to wait for him.

The next morning, Katie and Don were summoned to Newhouse's office—no doubt, Katie thought, for a good chewing out. They knocked on the Sheriff's door. A strained voice called them in.

Sheriff Newhouse and Officer Molloy must have been sharing a great joke. Both were wide-eyed and red-faced. "'FREE ICE CREAM!'..." Newhouse laughed toward Katie. "How'd you ever think of that one?"

"Well..."

"I have to hand it to you, it certainly worked. We could hear you from four blocks away."

"Five blocks here," Don added.

"For years, we cops have been trying to get peoples'

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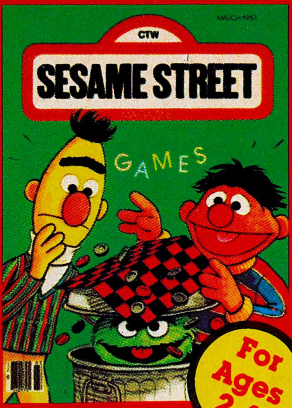

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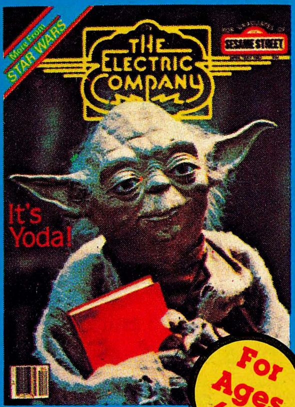

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Katie put the tools behind the crook's van. In a second, the van's tires were flat and the four crooks took off after her.

attention with police whistles—when shouting 'FREE ICE CREAM!' would have worked even better," Newhouse said, still grinning.

But then the Sheriff got a stern look on his face. "I thought I told you to stay out of this. You are very lucky that things went your way, Miss Parker. We have the crooks and their fence in custody...plus the stuff they'd taken from that last house."

Katie was surprised. "I didn't think the fence was with them last night," she said.

"He wasn't," Molloy broke in. "We got him later."

"You see," Newhouse continued, "those gifts the crooks were leaving behind were the worthless items their fence wouldn't accept. The crooks couldn't keep that incriminating evidence around, so they left the 'gifts' in other victims' homes."

"That still doesn't explain how you nabbed the fence," Katie reminded them.

"Oh, yeah," Newhouse said. "You can chalk that up to the old saying that there's no honor among thieves. When I told them that Katie—'the snoop'—tracked them down using their fence's rejects, they were so mad, *they turned him in, too!*"

DAVID B. POWELL is a writer who lives in Massachusetts and specializes in computers. Story © 1985, David B. Powell

FROM KATIE'S DOSSIER

In "The Case of the Crystal Cat," Katie caught a gang of burglars by analyzing their robberies and plotting their behavior. To help her predict where they might strike next, Katie used her computer's word processing and screen graphics software.

In real life, police departments have been using even more complicated programs to help them fight crime. They include the following:

- CASS (*C*rime *A*nalysis *S*ystem *S*upport) gives detectives leads by analyzing criminals' behavior, and predicting where they might strike next. CASS has also helped fire departments track down arsonists, who also tend to follow strong patterns.
- PATREC (*Pat*tern *Rec*ognition) analyzes a police artist's sketch of a criminal, and pulls similar mug shots from police files.
- CADS (*C*omputer-*A*ided *D*ispatch *S*ystem) dispatches officers fast. They can even arrive *during* a crime.
- MICRONYMS stores and matches fingerprints.
- CATCH (Computer-Assisted Terminal Criminal Arrest) helps catch crooks by scanning previous crime reports for likely suspects.

But these programs will seem like toys when compared with "artificial intelligence" programs like AURA (Automated Reasoning Assistant). AURA almost seems to think and reason like a human. Already AURA has "thought through" problems in mathematics, computer design and nuclear safety, without "knowing" anything about these areas. Soon, AURA may be packaged in a personal, or even a pocket, computer. Then, detectives in the field may be able to punch in their problems, and get the computer's instant suggestions. *—D.B.P.*

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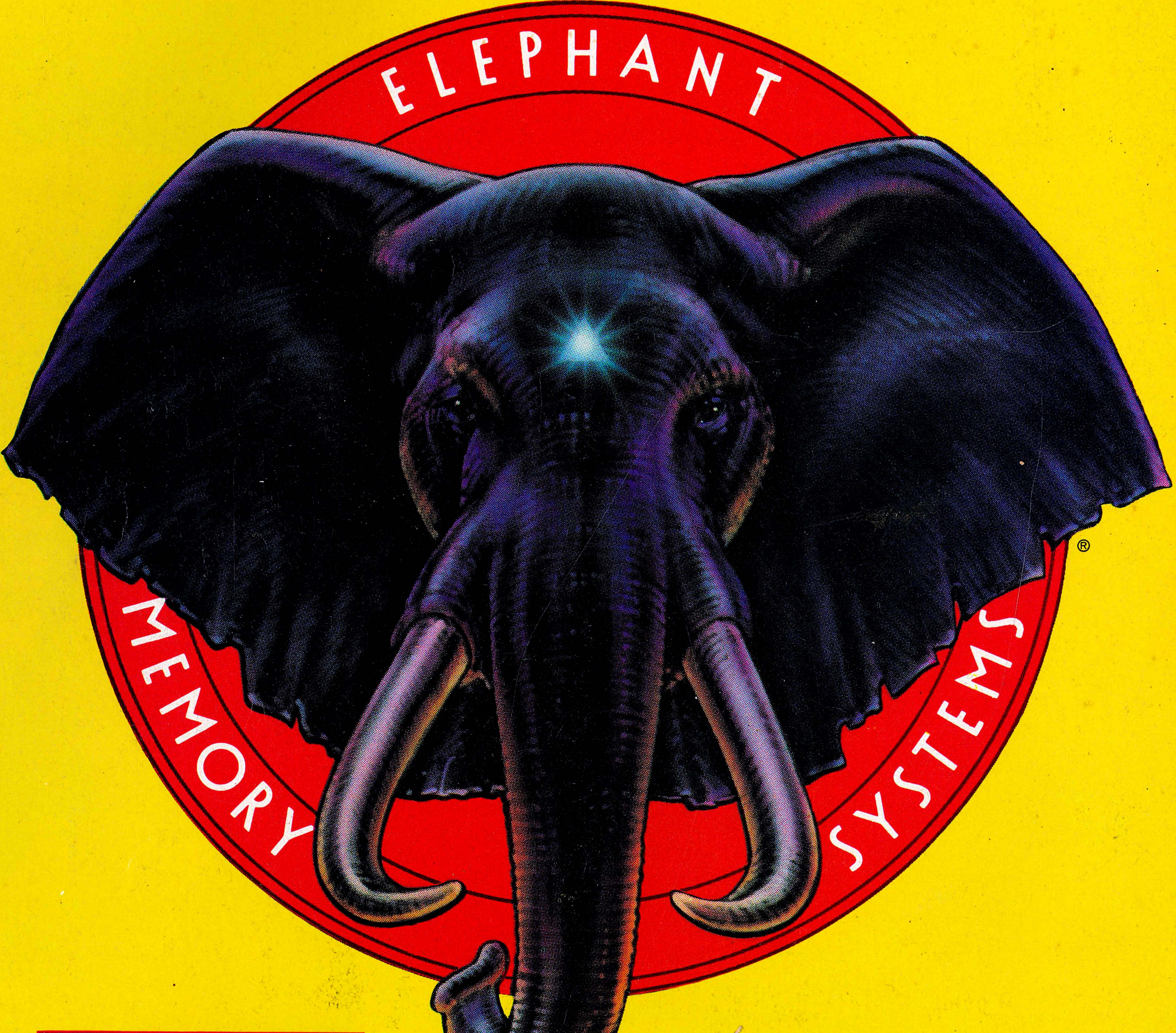

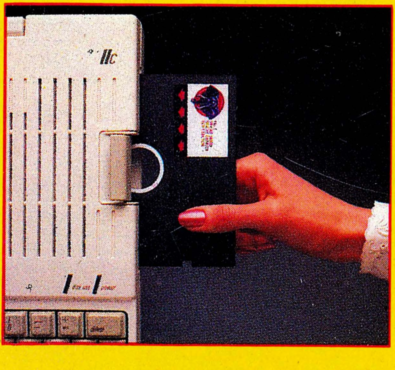

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